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Bulletin No. 124 - Fruit Variety Tests on the Southern Utah Experiment Farm

A. B. Ballantyne

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By A. B. BALLANTYNE

Logan, Utah, August, 1913
UTAH AGRICULTURAL EXPERIMENT STATION

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Fruit Variety Tests on the Southern Utah Experiment Farm

By A. B. Ballantyne

Since the material contained in the following report of the variety tests on the Southern Utah Experiment Farm was mainly accumulated under plans outlined before the farm was made part of the Utah Experiment Station, it may be well in this connection to give a brief history of its location, management, and a survey of its situation.

It was established by an act of the State Legislature approved March 21, 1899, and the site was chosen the following July by a committee appointed by Governor Heber M. Wells. The area selected consists of forty acres located in the south-eastern portion of the Washington field, about four miles south-east of St. George.

The tract of land was placed under the supervision of the State Board of Horticulture, of which Thomas Judd of LaVerkin was president, with H. E. Carey of Provo and J. A. Wright of Ogden, vice-president and secretary respectively.

The board delegated Thomas Judd custodian and according to the plans adopted by the board, and under Mr. Judd’s direction the farm was cleared, fenced, placed in shape for cultivation and planted. Mr. George F. Jarvis was employed as foreman, and continued in this capacity up to February 28, 1902. He was succeeded by Jos. T. Atkins, who remained in charge up to January 1, 1911, when he was succeeded by the writer.

Thomas Judd remained president of the State Board of Horticulture until after the farm at St. George was transferred to the control of the Utah Experiment Station. B. H. Bower succeeded H. E. Carey in 1901. In 1903 the board was in-
creased to four members; Mons Peterson of Moab was named as the new member, and in that year J. H. Parry succeeded J. A. Wright as secretary.

In 1905 the State Legislature again changed the personnel of the board, making the director of the State Experiment Station a member and the board as constituted for the succeeding biennium was Thomas Judd, president; C. A. Hickenlooper, secretary; J. A. Widtsoe, J. D. Wadley and J. E. Cox. The latter died and was succeeded by J. E. Taylor, who was elected secretary after Mr. Hickenlooper sent in his resignation. On June 12, 1905, Dr. Widtsoe resigned as director of the Experiment Station, and his successor, P. A. Yoder, became a member of the board. The Legislature of that year transferred the control of the Southern Utah Experiment farm to the Utah Experiment Station. This was accomplished on May 9. The farm was placed by the director, P. A. Yoder, under the immediate supervision of R. S. Northrop, the Station Horticul­turist.

In 1907, P. A. Yoder resigned, and the present director, Dr. E. D. Ball, was appointed his successor. R. S. Northrop was succeeded in 1909 by Wm. Homer, and he by Dr. Leon D. Batchelor in 1910.

LOCATION AND SITUATION.

To properly understand the location of the Experiment Farm, relative to the rest of the section, we must take a brief summary of the location of the different communities in Washington county constituting Utah's "Dixie." For convenience sake we will divide it into three sections, viz: The St. George, or western district; the central district, and the eastern district. The last named includes all of the settlements east of LaVerkin along the Rio Virgin, extending eastward from it a distance of probably forty miles.

The towns include Virgin City, Grafton, Rockville and Springdale. The soil types throughout this district are about the same, usually fine gravels, loams and sands. The cultivated lands generally lie in the canyon on each side of the river, and range from five feet to about forty feet above it. Thus
situated they are being more or less rapidly washed away by the flood waters of the river. The lands are all well drained in regard to both water and air conditions—most of the land, as would be expected, lying directly in the path of the air currents that sweep the canyon. The soil all along the river in this district is very fertile and responds bountifully to the care it receives.

The central district includes Hurricane, LaVerkin, Toquerville, Anderson’s Ranch, Leeds and Harrisburg. Hurricane is on a bench about 300 feet above the river, and has an area of nearly 2,800 acres under irrigation. The soil is mainly fine gravel and sandy loam, very high and well adapted in most parts to fruit culture, and generally seems to have excellent air and water drainage.

LaVerkin is situated much like Hurricane, though the bench is probably a hundred feet lower. The soil, the air and the water drainage conditions are also much alike, though there is at present a certain section that looks as though it might need draining in the near future. It does not, however, seem to be as bad as some of the land in other sections of the country.

Toquerville’s land lies between a black ridge and Ash creek, and nearly all of it is high above the bed of the stream. All of this land that the writer has seen is admirably adapted for fruit culture, and as far as reports and appearances indicate, is particularly free from damage by late spring frosts. The soil here was made from decomposing limestone, basalt and sandstone, and generally is very fine in texture.

Anderson’s Ranch lies in the path of the winds coming down a big draw, and in this way is free from severe damage by frosts. The soil is decomposed granite and is well drained.

Leeds and Harrisburg are also on benches from two to three hundred feet above the river and both have excellent air and water drainage. In both cases there is a ridge between them and the Rio Virgin, and both receive their irrigation water from springs lying between them and the Pine mountains. Their soil is mainly made up of decomposed granite and sandstone.

The Western or St. George district includes Washington, St. George, Santa Clara, Bloomington and the Washington
Field. Washington lies on benches, but is not as well drained as it could be, though it is from 30 to 150 feet above the river. It is watered by springs and the land on that account is more or less boggy in places, but none of it has actually gone bad. The soil is quite fertile, but varying in different sections. Fruit trees are not a complete success here.

St. George lies on a slight slope formed by the Red Hills and the Black Ridge coming together at a slightly acute angle. At the point of junction a draw opens up, down which the air drainage of the upland follows. The soil in St. George is not well drained, neither is it a success from the view point of the orchardist. Figs and almonds grow well and could be made to pay commercially. The soil is mainly made up of decomposed red sandstone underlaid with hardpan in some portions.

Santa Clara is located on benches lying on each side of the Santa Clara creek. Most of the land is high enough to give good soil drainage, but is so fine in texture that large areas are annually washed away by the flood waters of the creek. The air drainage is good and the section seldom suffers from the loss of fruit crops on account of late spring frosts. The soil here is of fine texture, very rich and with the possible exception of Bloomington is far better than any other soil in the Western district.

Bloomington is lower than Santa Clara, but resembles it in point of air drainage, though it may not have as good soil drainage. The soil is darker in color and not so uniform as it is at Santa Clara, otherwise it is much the same.

When we come to a consideration of the Washington Field, we must bear in mind that, excepting St. George and Bloomington, the rest of the agricultural areas of the middle and western sections are all on benches and all of them, excepting possibly Washington, have good air drainage and are consequently free from damage by late spring frosts. We must also remember that with the exception of St. George and possibly parts of Washington the soil of the rest of the formed areas is well drained.

Topographically the Washington Field is comparatively flat and is bounded on three sides by hills. On the fourth, or
north side it extends to the Rio Virgin, which enters and leaves the valley by gaps which it has worn.

The cultivated area of Washington Field thus lies south of the drainage line of the country and, as might be expected, is not much benefited by the air currents which follow the river bed. Furthermore, it has suffered so much from poor soil drainage that by 1910 much of the lower portions had gone bad, while the same conditions were affecting the higher lands. The average difference in the elevation between the high and low portions is about thirty feet.

Three types of soil* are found. On the steeper slopes we have the fine gravels more or less mixed with sand, and in the bottoms the clays. The rest of the soil in the field is sandy bordering on a sandy loam. The soil itself, particularly the last type, is uniformly deep and generally of about the same texture to a depth of at least ten or twelve feet.

Summing up the general conditions existing in the different agricultural districts of Utah's "Dixie," it is readily seen that excepting parts of Washington, St. George and the Washington Field nearly all of the land in all of the communities is well adapted for the growing of fruit, considering the questions of favorable soil and air drainage. Of course in all of the communities there may be found small patches of land that will be more or less subject to damage by late spring frosts, while other portions have poor soil drainage. Conversely there are patches in the Washington Field that are well adapted to fruit culture and unquestionably the same is true of the town of Washington, though it will scarcely be true of St. George.

The Experiment Farm itself, as before stated, is on the east side of the valley and well toward the south end, next to the canal. It received the benefits of the breezes that blow from the east and northeast. These, however, are not sufficient to prevent the late spring freezes which do much damage to the fruit crops and which most of the other sections seem to escape.

Then, too, in the matter of soil the choice has turned out to be an unfortunate one in that the soil drainage as before mentioned is very poor and has been responsible for the removal of nearly five acres of vineyard and about six acres of peach orchard.

*See Utah Exp. Sta, Bull. 121.
The question, "Why was the farm placed in a locality not representative of the fruit districts in Washington County?" may be asked. The answer, as given by one of the honored members of the commission who located the farm, is that they wanted to find out what the poorer land would do, because they knew what the good fruit land could produce and further that the results worked out under these more or less adverse conditions would apply in a greater degree to those sections that were more favorably situated.

Thus in reading the following report of the varietal tests it is only fair that we shall remember that these results have been obtained under extremely adverse conditions, very much unlike those of the rest of that section; and in that way do not represent what can be or is being done in Southern Utah.

**ORIGINAL PLAN OF THE WORK.**

The work first planned by the Board of Horticulture consisted mainly of variety tests in peaches, apricots, prunes, almonds, pears, cherries, grapes, etc., and demonstration experiments in planting, pruning trees, curing fruit and general orchard management. This, of course, was designed to discover the varieties adapted to the country and the best methods of caring for them and marketing the products.

As these experiments were only fairly started when the Utah Experiment Station came into control of the Farm, it was deemed best to continue them, as extensive plantings of fruit had already been made and as this sort of information was essential to the intelligent development of the horticultural interests of this section.

In addition to these tests, varieties of small fruit were planted, but these plants failed to grow. Other work has since been instituted along various lines, but the greater part of the work up to the beginning of 1911 was in testing out the different varieties.

In the fall of 1910, however, the main orchard on Plat C was pulled out, owing to the damage caused by seepage conditions.
FRUIT VARIETY TESTS.

SEEPAGE CONDITIONS.

As already intimated, the Washington field proper is suffering to quite an extent from seepage conditions. In order to secure a clearer idea of this let us review briefly the history of the field.

The first land brought under cultivation in the Washington Field was irrigated by water taken from the Rio Virgin and distributed by what is known as the “Old Ditch.” For about 20 years the water was diverted into this by means of a rock and brush dam, but since the floods were constantly washing it out it was finally decided to build a rock dam higher up and with it a new canal that would cover more land. Work was begun in 1890 and the water was turned into the new canal in 1893.

The soil troubles in the new portion of the field begun about 1898, in which year the lowest portion of the field “went bad.” Since that time the affected area has spread northerly and easterly, until nearly all of the lower lands show the effects of the seepage water.

The land thus affected shows it first by the decrease in vigor of the vegetation, followed shortly by the dark markings on the soil usually attributed to the presence of black alkali. Later the vegetation becomes stunted, then scanty and finally dies, being later replaced with salt bushes and weeds. The soil in the surface gradually assumes a granular structure, especially during the hot dry summer months. This condition is true of course only where the water does not come very near the surface.

On the Experiment Farm the seepage conditions began to affect the trees and vines as early as 1905 and by 1907 they were dying. The conditions in these orchards and vineyards were very similar to those in the orchards described by Dr. Headden in Bulletin No. 155 of the Colorado Expt. Station. The soil markings and structure were identical with those described in that publication for the soils under discussion, though here we hardly associate the discoloration and granulation with an excess of nitrogen, as analysis made by the Utah
Station show but .034 per cent of nitrogen as an average of four determinations.

By the summer of 1908 the vineyards on plats B and C were in such a bad condition that they were removed.

The trees in the big orchard on plat C had been suffering some, but it was hoped that the drainage of the lower lands west of the farm would avert that threatened destruction of the orchard. This, however, was not realized, as the number of sick trees increased and those already in the affected area began to die. The condition grew worse until it was decided to remove the orchard. This was accomplished during the fall of 1910.

The alfalfa patches on plat B have also shown the effect of the water, as the crops have become lighter and the plants less thrifty. The orchard on plat B is also suffering, but only a few trees have died and the rest look as though they were getting along alright. The eastern half of the farm is thus far unaffected.

**PUBLICATIONS.**

Two small bulletins on the Southern Utah Expt. Farm were published by the State Board of Horticulture before the change in control was made. The one printed in Jan., 1904, being devoted mainly to the possibilities of grape culture in Southern Utah. The one published in Jan., 1905, gave some of the first results of the yields of grapes together with a report on the general condition and progress of the farm. In 1907 the Horticulturist of the Utah Experiment Station compiled a progress report on the fruits and grapes, which was published as Bulletin No. 97 of the Utah Experiment Station.

The task of compiling the following report was assigned to the present superintendent and because it is somewhat late in appearing it must be said that this work has been accomplished in addition to the regular routine exacted by the work on the farm.

**EXTENT OF THIS REPORT.**

The material in the following pages embraces a final report of the varieties in the orchard and vineyard on plat C, and the
grapes planted on plat B. At the end is also a report on the results, and the condition in 1910 of the nuts that have been planted. No material is offered that is later than the year of 1910, so that all of the matter from which this report is compiled was recorded by the former foreman, Mr. Joseph T. Atkin, and to him is cheerfully given the credit for the results presented in the following pages.

THE RECORDS.

In passing it may be well to explain the general way in which the records have been kept.

An accurate account of the dates of leafing, time of beginning of blooming and the number of irrigations and cultivations was kept. Not many actual yields, however, are recorded, most of them being estimates, as the general tone of the record indicates. For example, in the records of the King's Prize Peach the yields are given thus: 1905, sample; 1906, 5 to 25 pounds; 1907, 1 to 50 pounds; 1908, 100 pounds to tree; and 1909, 200 pounds on some trees.

So, in giving yields in this report we have taken an average of figures like these and as we give them they read, 1906, 15 pounds; 1907, 25 pounds; 1908, 100 pounds and 1909, 100 pounds.

A copy of the body of this report was submitted to Mr. Atkin for correction and in reply he sent the following suggestions. In explanation of the indefiniteness of the record he says that a strip running north and south through the middle of the orchard was exceedingly poor and those trees never bore more than a few pounds per tree, while others on the same rows bore good crops.

Then the frost often killed nearly all of the crop, and usually the birds ate much of the fruit, so that in years of light crops they got most of it before it was ripe enough to pick.

The nectarines and almonds always bloomed profusely, but never bore a crop, while the Bartlet pear and the Newton apple never fruited.

On this account the matter in the following pages may lack definiteness of expression in places, but the compiler has endeavored to be fair in his treatment, and wherever the facts
under discussion would warrant it, definite statements and con­
cclusions are presented.

THE PLAT C ORCHARD.

This orchard was designed and planted in the spring of 1901 and constituted the first planting of commercial varieties of peaches, nectarines, apricots, prunes, apples and almonds. It was primarily designed as a varietal test and as such was continued until the spring of 1908. By this time it was thought that the different varieties of peaches and nectarines had had sufficient time to indicate their relative productiveness, quality and commercial value of fruit and resistance to unfavorable conditions, both soil and climatic. In that year, therefore, the above trees, excepting five rows across the west end of the orchard, were cut back and later in the summer budded to the Elberta Peach. The test of the other fruits was continued until the fall of 1910.

By consulting the map of Plat C, it will be noted that beginning on the north side there were first three rows of peaches, then three of nectarines, followed by ten rows more of peaches, eight rows of prunes, two of apricots, and one row of miscellaneous varieties of peaches, apricots, apples, pears and almonds, planted in a haphazard fashion, as an object lesson in contrast to the orderly planting of the rest of the orchard.

It will thus be seen that with the exception of the last mentioned row the varieties were planted in rows of thirty-four trees each. These rows were in an east and west line. The land sloped to the west and was therefore watered from the east.

CULTURE.

In general, it may be said that the orchard was given clean culture and according to the ideas of that method the system was thoroughly and efficiently carried out by the foreman, Mr. Atkin. It may be said that generally irrigations and heavy storms were followed as soon as practicable by cultivations.
The following table (No. 1) gives the annual number of irrigations and cultivations:

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<th>1901</th>
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<th>1906</th>
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<td>7</td>
<td>3</td>
<td>6</td>
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<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Cultivations ___</td>
<td>22</td>
<td>11</td>
<td>12</td>
<td>10</td>
<td>10</td>
<td>13</td>
<td>10</td>
<td>7</td>
<td>7</td>
<td>5</td>
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It will thus be seen that the orchard received an average of 6.9 irrigations and 10.7 cultivations annually. In 1904, it will be observed, the number of irrigations was but three, this notwithstanding the total rainfall for the year was but 5.08 inches. The probable reason for the small number of irrigations is that the trees bore no fruit in that year.

This method of bare or clean culture soon wears out the organic matter in the soil, in this way destroying the most desirable soil texture. The soil particles run together and puddle when receiving water, and if not cultivated soon, bake and thus form a crust which is impossible to properly pulverize when dry.

It is probable that it was to ultimately avoid this condition that a series of cover or green manure crops was planted in this orchard during the fall of 1905.

The experiment was made with eleven different crops, as follows: Whippoorwill Cowpeas, Soja Beans, Sand Vetches, Mammoth Clover, Crimson Clover, Sweet Clover, Burr Clover, Rape, Cow Horn Turnips, and Wheat, and one lot for a check. Each crop occupied a strip of land 27 feet wide extending across the eastern end of the entire orchard.

They were planted August 22, just before a good rain fell. The stand resulting was not very satisfactory, especially of some of the clovers and the vetches. Once they were up, however, they grew quite well, especially the rape and wheat. The Burr was the best of the clovers; the Cowhorn Turnips were a failure, and the first fall frost killed the Soja Beans and Cowpeas. The rest of the crops were disced the following July.
As far as can be learned, no more organic matter was added to the orchard, so that when it was removed in 1910 the soil was very hard, and crusted badly after rains and irrigations, unless immediately cultivated.

**PRUNING AND SPRAYING.**

The orchard was pruned at various times during the winter, depending entirely upon the convenience of the work, though it was done mostly during February and March. It was found during the different years that the later prunings were considerably better than those performed during the earlier months of the winter. This was because there was less drying out of the wood adjacent to the new cuts, and the healing process was more rapid and did not leave the unsightly stubs that the earlier pruning did.

The style of pruning was that generally adopted by the successful orchardists of the northern portion of the state. This seems to have been about right for the prunes, as very little cutting was done on them after the head was properly formed.

Whether it was entirely satisfactory with the rest of the orchard on plat C cannot be stated definitely, but it may be well to call attention to one principle of pruning—that of studying the plant, its growth and habits as affected by its environment. We find that, for example, the peach trees of Southern Utah are unlike the peach trees of central and northern Utah. They have a season for growth six to eight weeks longer and generally more soil stimulant in the shape of gypsum. These two factors produce greater growth and if the trees are pruned very severely, an exceedingly bushy tree results. If the rate of growth lessens enough to produce fruit buds before frost, such buds will be out toward the ends of the new branches, rather than near the base of the new growth, as they are on the trees growing in the northern part of the State. As most of the ends were cut off in pruning, the number of fruit buds were much reduced, resulting in light crops of fruit.

In the matter of spraying it was found advisable to use a winter spray of lime salt sulphur solution in the years 1902, 1904, 1905 and 1907. This kept the orchard practically free from any fungous diseases as well as aphids.
FRUIT VARIETY TESTS.

Three-Year-Old Peach Tree

Domestica Plums Are One of the Surest Fruit Crops of Washington County
RESULTS OF THE TESTS.

PEACHES.

In addition to the 15 varieties of peaches reported in full here, another lot of 10 varieties was planted in 1904 on plat D and to this another lot of five varieties was added in 1907. These later plantings will be reported upon in the future.

As noted before, in the spring of 1908 the following varieties were cut back and later in the summer budded to Elbertas; "Hale's Early, Utah Orange, Lemon Tree, Heath Cling, Old Mixon Cling, Orange and Lemon Clings, Old Mixon Free, Foster, Golden Drop and Stump the World, also the Boston Vibert and Warwick Nectarines."

There was a pruning experiment extending across the west end of the orchard which embraced the first four or five rows from the west. It was planned by the director to leave these and in addition four or five more trees per row adjacent, to continue the varietal test. However, in the execution of the plan the trees were cut back up to the trees included in the pruning experiment. Yields of the remaining trees had not been recorded, and thus the valuable results of 1908, 1909 and 1910 are lost.

King's Prize.

The trees of this variety bore a "sample" of fruit in 1905, the fifth season from planting. The average yield for the next four years was a trifle over 60 pounds per tree annually. The fruit usually ripened about August 12 and had a season of about nine days. It made an average annual growth of two feet.

This variety is recorded as being almost identical with the Elberta, and is no doubt the latter variety under a false name.

Hale's Early.

This variety yielded a few peaches in 1906 and 1907, the exact amount not recorded. The yield in 1908 was "1 to 20 pounds" per tree. It is described as an early peach of good quality, though "too tender to ship," and was much eaten by the birds. The fact that the tree made an average annual growth
of 5⅜ feet may indicate that the pruning was too severe and that the yields were thus reduced. It ripened about July 7 and its season may be said to extend over a period of about six days.

This variety may be recommended as an early peach for the home garden.

**Utah Orange.**

Unfortunately this peach did not respond to the culture and treatment given it as it is credited only with samples in 1905 and 1906 and none in 1907, so that we cannot say what position it would occupy as to yield under more favorable conditions or on a longer period of trial. It made an average annual growth of 2⅜ feet.

It ripened about August 1st and it had a season of about ten days.

**Lemon Free.**

Some of the trees in the row of this variety were not true to name; the fruit of part of them in 1906 ripened August 10, the rest September 15. It bore some fruit in 1905 and 1906, but the record does not say how much. The yield for 1907 was "from 1 to 20 pounds;" ripened about August 15, and the season extended over a period of ten days. The average annual growth was 3¾ feet.

**Heath Cling.**

The first crop of 4.5 pounds was borne in 1905, and was followed by fair crops in the next two years, the average for the three years being 18.16 pounds per tree. It ripened here August 25, and had a season of about ten days. The tree made an annual growth of about three feet. As a clingstone, the fruit of this variety is well liked in this section and can be highly recommended.

**Old Mixon Cling.**

Bore fruit only two years: 4½ pounds in 1905, and a "sample" in 1906. The fruit ripened August 21. Made 2¾ feet annual growth.

**Orange Cling.**

This yielded a "sample" of fruit in 1905 and 1906, which ripened about August 24. Annual growth 2½ feet.
Lemon Cling.

Like the Orange Cling, this yielded but samples in 1905 and 1906, and none in 1907. Annual growth 2½ feet. Ripened August 24.

Old Mixon Free.

Bore its first fruit the fifth year from planting. The average for three years was 12 pounds per tree. The fruit ripened August 15, and its season was nine days. Grew annually 3 3/4 feet.

Foster.

Yielded a "sample" in 1905 and 1907, and 5 to 20 pounds in 1906. Ripened August 2, and had a season of five days. Ripened on one side only, thus rendering it unfit to either handle or sell. Grew 2½ feet yearly.

Golden Drop.

Part of these trees were not true to name; some ripened June 28, the rest September 1, in 1905, the latter presumably being the Gold Drop. For 1906 and 1907, the average yield was 18¾ pounds. It made an annual growth of 2 1-3 feet. Ripened usually about August 26, and had a nine days season. It is characterized as being a "rather poor peach."

Stump.

Bore the fifth year from planting; averaged for the next two years 20 pounds. One tree in 1910 yielded 183 pounds of undersized fruit. Grew 3½ feet per year. It is credited with a season of 10 days length and ripened August 20.

Yielded 20 pounds per tree the fifth year from planting. The average for four years continuous bearing was 32 pounds annually. Yields not given for 1910. Ripens about August 11, and had a season of approximately twelve days. Not all of the trees in the row were true to name, but those that were as an average excelled the other varieties of peaches in yield and general excellence of fruit, excepting possibly the Elberta. The annual growth was 2 1-3 feet.
FRUIT VARIETY TESTS.

The Quince Thrives in the Semi-Tropical Climate

The Pomegranate Seldom Fails to Produce a Crop
Thurber.

Three trees of this variety were planted in 1901, in the row of mixed varieties. They bore some fruit in 1905, 20 pounds* in 1906, and 150 pounds* in 1907. Were cut back and budded to Elbertas in 1908. They ripened August 20, and the length of their season is given as five days. Reported to be a fair peach for drying.

Stewart.

Four trees of this variety were planted in 1901 in the same row as the Thurbers. Bore "a sample" the fifth year from planting and in 1906 ten pounds." Ripened August 20, and had a season of five days. Is described as being "only a fair peach." Grew annually 2 feet.

*Whether these yields are per tree or for the entire number, the record does not say, though it probably is per tree.

REVIEW OF PEACHES.

In the preceding pages we have treated the different varieties on the basis of their yields in pounds. To gain a clearer conception of those yields let us compare the most favored one, the Elberta, with what we know the average commercial orchard is producing. For the basis of this comparison we will assume that a peach tree of the Intermountain region will produce 1 1/2 cases of marketable peaches at 4 years from planting, 3 cases at 5 years, 4 cases at six years and six cases annually thereafter. Counting 160 trees per acre this will give us the following number of cases per acre. Included is the calculated acre yields in cases of the Elberta.

<table>
<thead>
<tr>
<th>Years Old</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Tree (in State)</td>
<td>240</td>
<td>480</td>
<td>640</td>
<td>960</td>
<td>960</td>
</tr>
<tr>
<td>Elberta (on the Farm)</td>
<td>160</td>
<td>110</td>
<td>110</td>
<td>560</td>
<td></td>
</tr>
</tbody>
</table>

It is thus readily seen that the trees on the Southern Utah Expt. Farm did not yield as soon nor as much as one would expect from an orchard in the northern or central part of the State.
If we did not happen to have some authentic figures on the yields of Elberta trees in southern Utah we might conclude that they did not yield well in this section. An orchard of 229 trees growing under almost the same conditions as these Elbertas yielded in its fourth season 53 pounds of splendid peaches, or at the rate of about 400 cases of marketable peaches per acre, and there is every reason to suppose it will yield at least one and one-half or two times as much in the fifth season.

Going back to a consideration of the varieties themselves, we find that the Elberta gave the best results under those conditions, with the Hale’s Early and Heath Cling next in order.

The Hale’s Early may be planted in a limited way for home use, while the Heath Cling might be grown for the markets that desire a medium late cling peach. It might be well to note that some of the trees of several varieties were not true to name, though evidently not seedlings.

NECTARINES.

Boston.

This variety made a good growth of wood, averaging 2½ feet annually, but produced no fruit excepting a “sample” in 1905. The date of ripening is given as August 4.

Early Vibert.

The first fruit, “a sample” was borne the fourth season. The next season none was produced and in 1906 a “sample” was again borne. Ripened August 15. Season last of July and middle of August. Fruit a small freestone. Made an annual growth of 1 3-4 feet.

Warwick.

This nectarine grew luxuriantly, averaging 3 feet annually, but did not produce any better than the other two varieties, yielding a “sample” in 1905 and “one peck of fruit on row” in 1906. Ripens about August 20, and its length of season is given as about three days.
REVIEW OF NECTARINES.

From the recorded results of the trial of the nectarines, we cannot recommend them for localities situated as is the Experiment Farm, unless the general method of treatment was at fault. Examination of the records show that the nectarines bloomed each year after 1903 and the graphs of the blooming periods and minimum temperatures invariably show a drop of from 5 degrees to 11 degrees below freezing temperature either just before, during, or after the trees were in blossom. This may wholly or in part account for the nonproductiveness of the nectarines. If freezing temperatures alone are responsible for the failure to bear, then it is possible that those occurring just near or at the time of blooming did all of the damage, as the winter temperatures do not, as far as can be learned, ordinarily affect any of the fruit buds of plums, peaches, apricots, cherries or apples.

APRICOTS.

Bengorme.

Four trees of this variety were planted in the row of mixed varieties on Plat C. Fruited the fifth season and yielded ten pounds annually for the succeeding three years: whether this was per tree or the entire crop the record does not state—probably per tree. Ripened about June 25 and had a season of about ten days length. Annual growth 1 3/4 feet. The fruit of this variety was small and extremely acid, making it undesirable for any purpose. Trees died in 1908.

Hemskirk.

Bore the fifth season and thereafter until the trees died in 1910. None of the yields are recorded excepting 25 pounds for 1908. From this we might assume that the variety was of little merit, though the birds ate much of the fruit. Ripens June 25 and has a season length of five days.

Thirty-four trees each of this variety and the following one were planted.

Cole's Mammoth.

These yielded four pounds per tree in 1905. The next two crops were light (samples) followed by a 25-pound crop in 1908.
FRUIT VARIETY TESTS.

and another “sample” in 1909. They died before the fruit matured in 1910. Ripened June 25, and its season extended over a period of five days. The fruit was badly eaten by birds. Its average annual growth was 3 1-3 feet.

REVIEW OF APRICOTS.

As already indicated, the Bengorme, though early in maturing, cannot be recommended for this section. The fruit of the remaining two was of good flavor and quality, though the crops were light, due, presumably, to the frosty conditions at the time of blooming or thereabouts. In general, apricots do not seem to be secure from the damage of spring frosts on the Southern Utah Experiment Farm, though this is not true of most of the other localities in this fruit section. Leeds and Toquerville usually have excellent crops of apricots.

The yields that we have obtained on the Experiment Farm are not at all flattering when they are compared with those one expects from commercial orchards of the same age.

Apricot trees in general will yield nearly as many pounds of fruit per tree as a peach tree of the same age. At this rate a commercial orchard would be expected to produce not less than 640 cases of apricots in its eighth year, while the Cole’s Mammoth and Hemskirk produced at the rate of 160 cases per acre at this same age.

PRUNES.

In the following list of prunes, thirty-four trees of each variety were planted unless otherwise specified.

Agen (French Prune).

This variety began bearing the fifth season. They averaged a trifle less than eleven pounds annually for the next three seasons, were not harvested at all in 1909, but yielded 67 pounds—average of three trees—in 1910. They averaged 4 feet growth annually.

Fruit ripened August 20, and as near as we can make out from the records had a season of nearly twenty days. This combined with the sweetness of the fruit and its other curing qualities makes this one of the promising prunes for drying.
Table No. 1—Production and Seasonal Data.

<table>
<thead>
<tr>
<th>Variety</th>
<th>No. Yrs. Fruited</th>
<th>No. Yrs. Barren</th>
<th>Total Range of Season</th>
<th>Average length of Season</th>
<th>Average Time of Ripening</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Peaches</strong></td>
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<tr>
<td>Hale's Early</td>
<td>3</td>
<td>2</td>
<td>July 4, July 10</td>
<td>6 days</td>
<td>July 7</td>
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<tr>
<td>Utah Orange</td>
<td>2</td>
<td>3</td>
<td>July 25, Aug. 3</td>
<td>10 days</td>
<td>Aug. 1</td>
</tr>
<tr>
<td>Lemon Free</td>
<td>3</td>
<td>2</td>
<td>Aug. 5, Sept. 15</td>
<td>10 days</td>
<td>Aug. 15</td>
</tr>
<tr>
<td>Heath Cling</td>
<td>3</td>
<td>2</td>
<td>Aug. 20, Aug. 30</td>
<td>10 days</td>
<td>Aug. 25</td>
</tr>
<tr>
<td>Old Mixon Cling</td>
<td>2</td>
<td>3</td>
<td>Aug. 20, Aug. 22</td>
<td>2 days</td>
<td>Aug. 21</td>
</tr>
<tr>
<td>Orange Cling</td>
<td>2</td>
<td>3</td>
<td>Aug. 20, Aug. 28</td>
<td>8 days</td>
<td>Aug. 24</td>
</tr>
<tr>
<td>Lemon Cling</td>
<td>2</td>
<td>3</td>
<td>Aug. 20, Aug. 28</td>
<td>8 days</td>
<td>Aug. 24</td>
</tr>
<tr>
<td>Old Mixon Free</td>
<td>3</td>
<td>2</td>
<td>Aug. 8, Aug. 20</td>
<td>9 days</td>
<td>Aug. 15</td>
</tr>
<tr>
<td>Foster</td>
<td>3</td>
<td>2</td>
<td>July 25, Aug. 9</td>
<td>5 days</td>
<td>Aug. 2</td>
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<tr>
<td>Gold Drop</td>
<td>3</td>
<td>2</td>
<td>Aug. 20, Sept. 1</td>
<td>9 days</td>
<td>Aug. 26</td>
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<tr>
<td>Stump</td>
<td>3</td>
<td>2</td>
<td>Aug. 10, Sept. 1</td>
<td>10 days</td>
<td>Aug. 20</td>
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<td>Elberta</td>
<td>5</td>
<td>2</td>
<td>Aug. 5, Aug. 23</td>
<td>12 days</td>
<td>Aug. 11</td>
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<td>Thurber</td>
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<td>Aug. 20</td>
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<td>Stewart</td>
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<td>1</td>
<td>Aug. 20, Aug. 25</td>
<td>5 days</td>
<td>Aug. 20</td>
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<td>2</td>
<td>3</td>
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<td>Hemskirk</td>
<td>6</td>
<td>2</td>
<td>June 23, July 2</td>
<td>5 days</td>
<td>June 25</td>
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<td>Cole's Mammoth</td>
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<td>2</td>
<td>June 21, July 2</td>
<td>5 days</td>
<td>June 25</td>
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<tr>
<td>Agen</td>
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<td></td>
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<td>20 days</td>
<td>Aug. 20</td>
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<td>20 days</td>
<td>Sept. 15</td>
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<td>July 10</td>
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<td>6 days</td>
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<td>Imperial Epineuse</td>
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<td>Aug. 15, Sept. 15</td>
<td>10 days</td>
<td>Aug. 25</td>
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<td>Tragedy</td>
<td>5</td>
<td></td>
<td>July 15, Aug. 1</td>
<td>6 days</td>
<td>July 22</td>
</tr>
<tr>
<td>Golden Drop</td>
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<td>July 25, Aug. 30</td>
<td>10 days</td>
<td>Aug. 10</td>
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<td>Hungarian</td>
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<td></td>
<td>Aug. 18, Sept. 8</td>
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<td>Sugar Prune</td>
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<td>1</td>
<td>Aug. 15, Aug. 20</td>
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<td>6</td>
<td></td>
<td>Aug. 30, Oct. 1</td>
<td>15 days</td>
<td>Sept. 5</td>
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</tbody>
</table>
FRUIT VARIETY TESTS.

German Prune.

These, like the French prunes, began bearing in 1905, and for the next three years averaged slightly over seven pounds per tree. In 1909 and 1910 the fruit was not picked at all, so no yields are recorded.

Fruit ripened September 5 and had a season length of nearly fifteen days. Made an annual growth of 4 feet.

Italian Prune.

They began bearing the same year as the preceding, and averaged for the next three years slightly more than fourteen pounds annually. Like the preceding, the 1909 and 1910 crops were not harvested and the yields thus not recorded. Fruit ripened about September 15 and the season extended over nearly three weeks. The growth was 2 feet annually.

Golden Prune.

Bore its first "samples" in 1905 and 1906, followed by 20.5 pounds in 1907 and another sample in 1908. The crops of 1909 and 1910 are not recorded as to the amounts, though the ripening periods are given. It ripened about August 3 and had a season length of six days. It seems to have been well liked for the excellence of the dried product. It grew 2 1/3 feet annually.

As near as we can glean from the records, this prune suffered rather more than some of the other varieties from the variations in level of the free water in the soil.

Golden Drop (Silver Prune).

This variety is credited with a "sample" of fruit on one of the two records in 1905, but on neither of them is it credited with blossoms for that year. It averaged a trifle over seventeen pounds annually for the next four years, with no credit for yield in 1910, though the ripening period is given. Ripened about August 10, and had a ten days season. It grew 2 1/2 feet annually.

It took three pounds of fresh prunes of this variety to make one pound of dried fruit with the pits removed. One of the best prunes for drying in this way.
Table No. 2—Yearly Yields.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Year First Bloomed</th>
<th>1903</th>
<th>1904</th>
<th>1905</th>
<th>1906</th>
<th>1907</th>
<th>1908</th>
<th>1909</th>
<th>1910</th>
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<tr>
<td>Hale's Early</td>
<td>1903</td>
<td>S</td>
<td>S</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Utah Orange</td>
<td>1903</td>
<td>S</td>
<td>S</td>
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<tr>
<td>Lemon Free</td>
<td>1903</td>
<td>*</td>
<td>*</td>
<td>10</td>
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<td>1905</td>
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<td>7</td>
<td>10</td>
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<td>1905</td>
<td>S</td>
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<td>10</td>
<td>30</td>
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<td>S</td>
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S equal Sample.
Imperial Epineuse.

This variety bore very small amounts the sixth and seventh years from planting, but in the next three years averaged 33 pounds per tree. The fruit ripened August 25 and its season extended over a period of ten days. The fruit was of medium size, good flavor, and very sweet; but not attractive in appearance, being dull red in color. The annual growth was slightly less than three feet.

Tragedy.

This variety came into bearing the fifth year and continued to fruit until the trees died or were pulled out. The average yield was 13.6 pounds yearly for five years. Ripened July 22, and its season was of ten days' duration. Annual growth 3½ feet. The birds always ate much of the fruit of this variety.

Hungarian.

Fruited the fifth season and in the succeeding five years produced an average of eighteen pounds yearly. It ripened August 22 and had a season of ten days. The fruit was of exceptional size and, after removing the pit, dried unusually well, producing a fine well-flavored product. This prune is recommended very highly for commercial planting, especially for curing. Wood growth was 2½ feet annually.

Sugar Prune.

There was but a single tree of this variety placed in the row of mixed varieties on Plat C. It did not fruit until the eighth season, when it produced 30 pounds. It produced a small amount the next year and died the next.

REVIEW OF PRUNES.

Among the foregoing prunes, the Hungarian seems to be the one that can be most highly recommended, though it did not produce as highly as the Imperial Epineuse. The record contains no comments on the value of the dried fruit of the latter variety.

Golden Drop, Agen, and Italian prunes seem to fall next in order of performance.
In the accompanying table of acre yields in cases of 25 pounds net of prunes, we have included a conservation estimate of what a prune orchard ought to yield under favorable conditions. Of course this will be too high for some and too low for other varieties.

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<td>200</td>
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*Not picked.

PLUMS.

Wickson.

Three trees planted in the row of mixed varieties bore 1 3-5 pounds the sixth year from planting. They died the next year. The fruit ripened July 4. The amount of yearly wood growth is not given.

Two trees of this variety are still living in the orchard on Plat B and will be reported later.

Satsuma.

Four trees were planted in the row of mixed varieties. They bore two dozen plums in 1906, which ripened July 4. They were all dead in 1907. The amount of annual wood growth is not given so we can form no idea of the relative vigor of the tree.

Simon.

Seventy trees of this variety were planted along the sides of the East Avenue in 1900. They came into bearing in 1904 and excepting 1907, continued up to 1910, which is as far as this re-
port extends. The average yield was 21 pounds annually for the six years.

Fruit ripened about the middle of July and the season extended over a period of eighteen days or longer.

This plum is of good size and attractive in color, being a dark red when fully ripe. It sells on sight, once at least, but as a rule those having tried it once prefer something else the next time. This is because of its characteristic flavor, which does not appeal to the taste of most people. It does, however, make excellent preserves and jellies, and for this purpose can be highly recommended.

The tree here is badly affected by gumosis and by the fall of 1910 twenty-two trees had died from its effects.

**BARTLETT PEAR.**

Three trees of this variety were planted in 1901 in the row of mixed varieties on C. They are credited with blossoms in the seventh and eighth years from planting, but no yields of fruits are recorded. There were, however, a few specimens on the trees in the summer of 1910, and those remained there until after October 1. The annual growth was \(1\frac{1}{2}\) feet.

From the observations of the writer, this variety seems to be desirable for this section, as it endured the unfavorable soil conditions on the farm, and the fruit seems to mature after the hottest of the weather is past.

**APPLES.**

Whatever may be said about the excellence of Utah's Dixie as a peach, plum and grape section, the same cannot be said of it when we speak about apple growing as a whole. This is because, at present, and we may say for some time to come, it would be impossible to transport them cheaply enough to compete with northern grown winter apples, though this may not necessarily be true of the early summer apples produced in Washington county. Besides the climate is so warm that the winter apples of the cooler regions mature so early in the fall that they are ready for use in October and November and by Christmas have become unfit for use.
Of course this climatic condition favors the growing of summer apples and prospects are favorable for a great development along that line.

**Yellow Transparent.**

In 1900, seventy-two trees of this variety were planted along the sides of the north avenue of the farm. They were at first headed low as in ordinary orchard practice, but in 1902 were pruned up for avenue trees. This retarded bearing and produced trunks more or less ill-shaped.

They bore a few apples in 1906, and, excepting 1908, thereafter. Omitting the unproductive season up to and including 1910, the average yield per tree was 28 pounds annually, or about 50 bushels per acre of marketable apples.

They have grown thriftily, averaging 3 feet yearly. The crop ripens about July 1, and the season varies from five to ten days in length.

The fruit is acid in flavor and rapidly becomes mealy and breaks down. This might be lessened if a cool storage were provided pending distribution.

**Newton.**

Three trees were planted in the row of mixed varieties in the orchard on C in 1901. They grew well, averaging two feet annually. The record shows no production of either blossoms or fruit, though they should have borne within ten years.

**SUMMARY OF PLAT C ORCHARD.**

Briefly stated from the foregoing, we cannot consider the varietal test in the Plat C orchard to have been a complete success. It has, however, served to show that one may safely plant Elberta, and Heath Cling peaches, and most of the prunes, and at least the Bartlett Pear, on any soil in Southern Utah, that is at all adapted to fruit culture, and expect them to give comparative satisfaction. The short life of the orchard has also shown that unusual care must be exercised in the selection of an orchard site, especially studying the probable effect of spring frosts and soil drainage, to avoid the consequent loss of fruit and early death of the trees.
FRUIT VARIETY TESTS.

NUTS.

Up to the time the station was established, about the only nuts growing in southern Utah were almonds, though there were a few seedling walnuts and one or two pecans. It was natural, therefore, in planning a variety test that almonds at least should have a place. Accordingly, four Paper Shell and five Ne Plus Ultra almonds made up the first lot. These were planted in the row of mixed varieties on Plat C in 1901.

The scope of the test was ultimately enlarged to include most of the nuts of commerce thought likely to grow in this section. Walnut trees of Santa Clara and Leeds ten and twelve years old and one or two pecans at Toquerville about the same age justified the trial of these nuts. Then it was thought probable that filberts and chestnuts would grow and accordingly varieties of these were planted.

The results of these plantings and the numbers planted in the different years is shown in the accompanying table.

This report on these nuts is not final, excepting for the Ne Plus Ultra and Paper Shell almonds planted on Plat C, which were pulled out in the fall of 1910.

Almonds.

A glance at the following table shows that the percentage of Jorden almond trees that lived was only 23.5 per cent, while of the other two none died until 1909 and 1910.

The records show that these two last varieties, Ne Plus Ultra and Paper Shell, bloomed about the same time, the first blossoms appearing in 1906. No nuts, however, were produced either that year or the one following and but a few in 1908. These ripened September 1 and were picked September 15, thus making it possible to harvest them during the dry, warm weather of early fall. No nuts were produced in 1909 and 1910. The growth was about 1½ feet annually. These trees attained an average height in the ten years of 13 feet.

Just why they did not produce more than they did is not entirely clear, though it is probable that the annual spring frosts had some effect.
Jorden.

The Jorden almond has made but little if any better record than the preceding, producing but 12 nuts in 1908, none the next year, and a very few in 1910. It is probable that frosts killed much of the fruit and it may be possible that this variety may be self sterile in this district.

Chestnuts.

Nine varieties of chestnuts, totalling 55 trees, have been tried. These were planted in 1903, 1906 and 1909, and though they were given the best of care, none of them so much as lived through the first season. Why this is we are unable to say, and it seems that if we are to secure a stand of these trees, we must secure and plant the nuts and then bud them to the standard varieties.

Filberts.

Of four trees planted in 1906, only two lived through the summer and these died the ensuing winter.

Pecans.

The Pecans have done better than any of the other nuts, there being at the present time 20 trees alive, or 37.6 per cent of the entire number planted. Of the lots planted in 1903 and 1904 none lived, which may indicate that the fault was not under our immediate control. By eliminating these two plantings the percentage that is now living is raised to 76.9, which is not a bad record for pecans.

None of the trees have borne yet, but some of them are growing quite thriftily.

The Russel Pecan tree on Plat D was 3 feet high in 1910, having made a growth of one and half feet in that season.

The Pabst Pecan tree near it is 4 feet high and grew one foot in 1910.

Eight Mammoth Paper Shell Pecans average slightly less than 6 feet in height and have grown from 2 to 3 feet in the past season.

One of the two Frotscher Pecans on Plat D is now 9 feet tall and grew 3 feet the past season.
FRUIT VARIETY TESTS.

All in all the pecans will probably live and ultimately produce nuts. The leaves become spotted and burned somewhat through the summer, the degree depending directly upon the intensity of the sun's rays and the prevalence of dry hot winds. This of course retards their growth through the summer and when the cooler weather of fall begins a new growth starts, which does not always harden sufficiently to endure the frosts of the winter. They are, however, rapidly overcoming this condition.

Walnuts.

A total of 74 walnut trees have been planted and out of these there were, in the fall of 1910, 31 living or 42 per cent. This number will gradually decrease as some of the trees are almost dead and but few, if any, promise to live very long.

In all ten varieties have been planted, the percentage of each living ranging from nothing to 66.6 per cent. Of those planted in 1904, seven are living. The Santa Barbara Soft Shell and the Parisienne were at the end of 1910 eight and ten feet in height, respectively. They have invariably frozen back to the trunk each winter and annually make a growth of five or six feet. Whether they will ultimately live is a question. The leaves of these suffer from the burning and drying effect of wind and sun as do the pecans. This of course may be partly or entirely due to the presence in the soil of more or less harmful soluble alkaline salts.

REVIEW OF NUTS.

Nuciculture in Utah's Dixie may in time prove a success, though from the experience gained on the farm it does not promise at all well, excepting possibly for the pecans. On higher and richer soils, however, walnuts, pecans and almonds have grown well, though the trees were in most cases seedlings. If any successful systematic trial of varieties is to be conducted in Southern Utah, it will be necessary to either purchase or lease some bench lands for this purpose or to do the work co-operatively.
Table No. 3.—Showing Number of Nut Trees Planted and Number and Percentage that Lived.

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The variety test in grapes has resulted in six different lots being planted, making a total of 86 varieties tested or being tested at the present time. Thirty-five varieties were received in 1908 from the Government Experiment Station at Chico, California. They are newly introduced, and as they have made no record as to yields they will not be given further consideration at this time.

Of the remaining 51 varieties, 13 are American grapes or of American origin. The others are Vitus vinifera or European grapes. We have only five native American species on trial, four Vitus labrusca and one Vitus bourquiniana, the other classed as of American origin being a cross of the labrusca and vinifera species.

Planting and Culture.

All grapes on the station are planted 7x7 feet and are trained to the stump form.

Considerable difficulty has been experienced in getting some of the varieties to grow. This has probably been due to the necessity of securing the young plants from California, the difference in the season operating against the plants. Besides, the distance from the railroad and uncertainty of railroad service has caused shipments to be as long as 35 days in transit.

The grapes are all given clean culture. They were cultivated about twelve times annually the first two years, after which the number was reduced to five or six. They have been irrigated from five to ten times during the season, depending in some degree upon the amount of rainfall.

Pruning has been done in January, February and March, depending upon the convenience of the work.

The first lot of grapes was planted on Plat C in 1900. It was made up wholly of European grapes of the following fifteen standard varieties.

Cornichon.
Black Prince.
Black Ferarra.
Black Hamburg.
California Mission.
Early Silver Frontignon.
Fehr Zagos (Fehr Szagos).
Flame Tokay.
Lady Downing.
Muscat of Alexandria (M. Gordo Blanco).
Purple Damascus.
Royal Muscadine (Royal Muscat).
Thompson Seedless.
Zante.
Zinfandel.

In 1902 fourteen new varieties were planted on Plat B, Block 3, and were as follows:

- Almeria.
- Black Malvoise.
- Black Morocco.
- Bowood Muscat.
- Campbell's Early.
- Chasselas de Fontainbleu.
- Chasselas Rose.
- Chasselas Vibert.
- Early Madeline.
- Golden Champion.
- Golden Chasselas.
- Gros Colman.
- Johannesburg Riesling.
- Sable Kanski.

All of these, excepting Campbell's Early (labrusca x vinifera) are, as near as we can tell, of European origin. In addition to these, one resistant variety (Rupestris St. George) was planted, and in 1904 the roots were grafted to Thompson seedless, Muscat, Gordo Blanco and Cornichon.

Only five new varieties of grapes were added in 1904, these being:

- Burgundy.
- Emperor.
- Hungarian Tokay.
- Isabella.
- Jarvis.
FRUIT VARIETY TESTS.

More extensive plantings were made of some of the other varieties in order to have quantities to work with. In addition, four new varieties of resistant vines were planted. Part of the roots of these were tongue grafted to Vinifera scions, as follows:

- Riparia to Muscat of Alexandria.
- Rupestris Metallica to Emperor.
- Rupestris St. George to Cornichon.
- Riparia a Grandes Feuilles to Thompson Seedless.
- Rupestris Metallica to Flame Tokay.
- Solonis to Flame Tokay.

Besides these, some of each variety of the resistant vines were planted and grafted to the Vinifera scions later.

In 1906 seventeen more varieties were added. These were divided as follows: 6 European or Vinifera and 11 American. Of the American grapes, 4 were pure Labrusca, 1 Bourquinian, the other crosses between the Vinifera and Labrusca species. They were as follows:

American—
- Agawam.
- Blue Spanish.
- Brighton.
- Catawba.
- Concord.
- Eaton.
- Goethe.
- Diamond (Moore’s Diamond).
- Niagara.
- Vergennes.
- Worden.

European—
- Alicante.
- Lady Finger.
- Malaga.
- Purple Damascus.
- Sultana.
- White Corinth.

The last lot of grapes was set out in 1909, consisting of about 2½ acres of Flame Tokay. This will constitute the commercial vineyard of shipping grapes.
Diseases.

The grapes on the farm become infested with mildew occasionally, but usually it is possible to control this by spraying during the winter with lime sulphur solution.

The vines are also largely affected with the crown gall of the grape and annually considerable numbers die from its effects, though in the past great diligence has been exercised in destroying plants thus affected. It has, however, now reached such a point that most of the vineyard would have to be removed if this policy was continued.

Grape Leaf Hopper.

We have been bothered more or less throughout the last few years with the grape leaf-hopper (Typhlocyba comes Say) in this section, commonly called the "grape fly." They appeared in numbers on the farm in 1908, but did not do very much damage that season. In 1909, however, they literally swarmed over the vineyards on the farm, making practically all of the grapes unfit for market and so injuring the leaves on the vines that most of them fell before frost. It may also be possible that the heavy drain on the juices of the plant by the grape leaf hoppers, together with the demands of the heavy fruit crop, so weakened the plants that they were thus unable to withstand the low temperatures of the following winter. At any rate, the loss from freezing was exceptionally heavy, even among the hardy varieties.

In the summer of 1910 the damage was not quite so great as it was in the preceding year, though the vines were badly defoliated. The fruit crop in this year was very light, due probably to the damage by the pest in 1909.

As already intimated, the chief damage to the vines consists in the loss of the leaves, the central portion of the vine losing its leaves and the fruit being exposed to the full glare of the sun.

The pest itself is not like the codling moth always with us and presenting about the same problem annually, but is periodic in its appearance. They have occurred in numbers in different places in Southern Utah in the past, and after causing considerable damage for a few years have disappeared. The same thing
FRUIT VARIETY TESTS.

has been experienced in California, where control measures have been worked out. One of these has been tried on the farm, but was not as successful with the materials used as it was in California.

Phylloxera.

We have not as yet been troubled with this dreaded pest, but, anticipating the possible infestation, different varieties of resistant or native American grapes have been planted.

Transplantation of Varieties.

As already noted, the vineyards planted in 1900 and 1902 were on Plats C and B, respectively. These were thus on the portion of the farm that went bad, and on that account twenty vines of each of the following varieties were transplanted in Plat D in 1906:

Chasselas de Fountainbleau.
Black Malvoise.
Black Morocco.
Bowood Muscat.
Golden Chasselas.
Golden Champion.
Early Madeline.
Chasselas Rose.
Sabal Kanski.
Gros Colman.
Johannesberg Riesling.
Zante.
Zinfandel.
Almeria.

Where these have fruited since transplanting, their record up to 1910 is included in this report. Early in the fall of 1908 the vineyards of Plats B and C were pulled out. In the following discussion of the behavior of the different varieties, each is on its own root unless otherwise stated.

Agawam (Labrusca X Vinifera), Planted 1906.

This grape thus far has done very well. It fruited the fourth year from planting, yielding about 2.5 lbs. per vine in that year.
In 1910 it yielded 8 lbs. per vine, this notwithstanding the severity of attack of the grape leaf hoppers in 1909 and 1910. The plant has made an average growth each year of $3\frac{1}{2}$ feet and has thus far passed the winter without injury.

**Alicante** (*V. Vinifera*), Planted 1906.

Vigorous grower, making an average growth of about 4 feet per year. The plant seems to be hardy, standing the winter well. Yielded a small amount of fruit the third and fourth seasons from planting. In 1909 the crop was about 5 lbs. per vine and in the next year 2 lbs. Is recorded as a good wine grape, the juice being of a beautiful red color.

**Almera** (*V. Vinifera*), Planted 1902, 1908.

During the nine years of trial of this grape, the most conspicuous characteristic shown is its extreme tenderness. The first winter 20 per cent of the vines were killed outright. The next year 87 per cent froze down to the ground, and since that time it has frozen down each year. It has made an average annual growth of 5 2-3 feet and has borne each season a few second crop grapes.

It has been tried on two different plats, on B and D. On B it was on a heavy soil, on D on a much lighter sandy soil. The vines on Plat B were partly killed by the water table rising and were removed in 1908, but those on Plat D are still on trial and it is hoped that they will ultimately prove successful.

**Cornichon** (*V. Vinifera*), Planted 1900, 1904.

Seventy-eight vines of this variety were planted in 1900, and in 1904 thirty-eight were grafted on two-year-old Rupestris St. George roots. Those have all been dug out on account of that part of the farm becoming "seeped."

There are at the present time 301 vines on their own roots and 175 on resistant roots, all on Plat D, planted in 1904.

This variety grows well, though it is not remarkably luxuriant, making an annual growth of about 3 feet. Until the winter of 1909-10 it suffered very little from freezing, the loss the first winter after planting being only 5 or 6 per cent. Last
winter, however, they suffered considerably from freezing, though not nearly as much as some other varieties. During the periods when the grape leaf hoppers become troublesome this variety seems to be more severely attacked than most of the others, and as a result the crops are reduced. It is, however, one of the most hardy of our European grapes. It is one of the heaviest yielders we have. The average yield prior to 1910 was about 11 pounds per vine, growing on its own root.

It does not yield nearly as well on the American roots, though the average annual growth of the plant is about the same. There has been a total of 170 vines growing on Rupestris St. George. These have yielded on an average 7 pounds per vine per year up to 1910. There are 131 Cornichons growing at present on this root.

We now have 44 vines growing on Rupestris Metallica, a resistant root. This root seems to be better adapted than the Rupestris St. George, as the average yield for the three years was about 9 pounds.

The season of the fruit is from September 30 to October 20. The fruit is reddish black with a heavy bloom, and is a large, firm, tough-skinned grape, which ships well.

In connection with the planting and propagation of these American roots, it may be interesting to note that scions grafted on two-year-old Rupestris metallica roots bore fruit the following year, and those on one-year-old Rupestris St. George roots yielded the same amount the second year from grafting. Further, roots of Rupestris St. George tongue grafted to Cornichon scions yielded the third season from planting. In other words, whether tongue grafted when planted or grafted the first or second year after planting, Cornichon grapes on an American root yielded about the same amount of grapes per vine the fourth season from planting. On its own root, it bears the second season from planting. Ripens September 10, and its season lasts until October 20.

Mission (V. Vinifera).

One hundred fifty-six vines of this variety were planted in 1900. They have frozen down each winter. One hundred twelve more were planted on Plat D in 1904 and have done very well.
They make an annual growth of about 3 feet when on their own root, and in the four years prior to 1910 averaged about 20 lbs. per vine. In addition to the above number of vines, in 1906 sixteen Rupestris St. George roots were grafted to Mission and yielded an average of about 11 lbs. per vine in each of the three years following. The plant makes an annual growth on the native root of 4 feet.

The grape is a very dark red, almost black, with a heavy bloom, has a good flavor, tough skin, firm sweet flesh, and consequently ships well. The bunches of this here are long and usually poorly filled, which is a serious drawback in making a perfect pack. It ripens October 1 to 15. Leaf hoppers infest it badly.

**Black Hamburg (V. Vinifera), 1900.**

Only one lot of 19 vines of this variety was planted. It did not grow well, making only a two-foot growth each year. No record was kept of yields beyond mention of fruiting and date of ripening, which ranged from August 15 to August 25. It yielded the third season and slightly thereafter until dug up in 1908.

**Black Prince (V. Vinifera), 1900, 1904.**

This variety is very tender and thus far has passed only two winters unhurt ('07-8, '08-9). It has grown very luxuriantly, averaging about 5½ feet per year. It has yielded extremely well when bearing, the two years average being 12.5 lbs.

There are on trial 129 vines on their own roots and 22 on Rupestris St. George. On this root it makes only a 3-foot growth and has yielded nothing but a sample. On the heavy soil it produced nothing and was dug up there in 1908. Season, August 10 to October 1. A very delicious grape and can be highly recommended for the home garden, largely on account of its extremely long season. This variety is quite hardy in nearly all other localities in this section.

**Black Malvoise (V. Vinifera), 1902.**

There are 22 of these vines growing on the station at present, the 78 planted in 1902 having been pulled up in 1908. It makes more than an average growth and yields regularly each
Washington County is Admirably Adapted to the Production of European Grapes

Japanese Plums, Like the Almond, are Usually Damaged By the Late Frosts
year about 9 pounds. It stands the winter well. The grapes ripened August 20 to September 1. Fruit is delicious but soft, an excellent wine grape, and one of the very finest dessert grapes.

**Black Morocco** (*V. Vinifera*), 1902.

Thirty-nine vines of this variety were planted, but have failed thus far to pass the winter unhurt. They make an annual growth of about 3.6 feet and produce a heavy second crop of grapes, most of which do not ripen. Its average yield has been about 4.3 lbs. Twenty vines are now on trial.

This grape is dark red, large and excellent in flavor and quality when ripe.

**Bowood Muscat** (*V. Vinifera*).

This raisin grape has not done well on that station. It yields irregularly, and then only averages about 2.5 lbs. for the bearing years. The vines make less than a three-foot annual growth and are very much damaged by leaf hoppers.

All of these vines on their own roots were pulled up on account of seepage conditions.

Twenty-one vines were grafted on two-year-old Rupestris St. George roots in 1906, and the only recorded yield is 1.5 lbs. in 1910.

The fruit of this variety is almost identical in appearance with that of the Muscat of Alexandria.

**Burgundy.**

Twenty-one vines of this grape were grafted on two-year-old Rupestris St. George roots in 1906. The vines make an average growth, but have not fruited.

**California Mission** (*V. Vinifera*).

This variety was first planted in 1900, 232 vines being started. On account of seepage they were all removed, 20 of them being replanted on Plat D in 1906. This variety, though hardy and doing well in the surrounding districts, yet freezes down each year and has yet to produce its first crop of grapes on the station during the ten years of trial.
FRUIT VARIETY TESTS.

Blue Spanish.

This is probably the same Black Spanish or Lenoir (Bourquiniana) described by Thomas in his American Fruit Culturist. There are at present ten vines of this variety on trial. It is well adapted to our conditions, producing in 1909 fifteen lbs. of grapes. Suffers severely from the ravages of leaf hoppers. Makes an annual growth of $3\frac{3}{4}$ feet. Is an excellent wine and dessert grape. Season, August 20 to September 20.

Brighton (*Labrusca X Vinifera*).

Ten vines are on trial. They make only a two-foot annual growth. Suffer severely from leaf hoppers. Have no records of yields.

Catawba (*Labrusca X Vinifera*).

Makes 3 feet annual growth, yields 2.5 lbs. grapes. Season, August 5 to 20.

Concord (*V. Labrusca*).

This section seems to be too hot for this, as well as the preceding variety. Makes an annual growth of 3 feet, yields about 6 lbs. of undersized grapes. Season, August 5 to 25.

Diamond (*Labrusca X Vinifera*).

Yields about 2 lbs. of delicious yellow grapes. The climate is too hot for this grape to reach perfection. Season, August 20 to 30.

Eaton (*V. Labrusca*).

Makes an average growth but has not yielded well. Behaves much like Concord.

Goethe (*Vinifera X Labrusca*).

This variety seems well adapted to Southern Utah conditions. Makes a good average growth. Yields 4.2 lbs. of large, pink, well flavored grapes. Withstands the ravages of the leaf hoppers very well. Season, September 20 to October 15.
Campbell Early (Labrusca X Vinifera).

Two lots of this variety were planted in 1902, 1904, but in both cases the vines failed to grow.

Chasselas de Fountainbleu (V. Vinifera).

This was planted in 1902 on Plat B and during the six years trial produced four crops, averaging 3½ lbs. per vine. The vine does not grow luxuriantly, and as it is only a medium early white grape is not recommended for this section. Season, August 8 to 20.

Chasselas Rose (V. Vinifera).

This is much more vigorous than Chasselas de Fountainbleu. Bears about 5 lbs. per year of small medium quality red grapes. Planted in 1902, on Plat B. Season same as preceding.

Chasselas Vibert (V. Vinifera).

A rather tender variety which was killed before fruiting by the winter of 1905-1907, four years after planting.

Early Madeline (V. Vinifera), 1902, Plat B.

An irregular bearer, though producing an early delicious grape, yielding about 4 lbs. per vine. They are remarkable for the large symmetrical bunches. Fruit greenish white, later becoming tinged with red. The best early grape we have. Vine vigorous average grower, fairly resistant to leaf hoppers, though it is probable they would attack it if there was not an abundance of other varieties. Season, July 24 to August 24.

Early Silver Frontignon (V. Vinifera), 1900, on Plat C.

Vine slender, not healthy, average annual growth of 2½ feet. Subject to mildew and crown gall, but yielded the second season from planting and each year thereafter, averaging 6.6 lbs. per vine annually. Grapes tender, of high flavor and quality.

Emperor (V. Vinifera), 1904.

We have at present the full numbers of vines planted in 1904. These are in a block of 302 vines. Two resistant roots are
being tried, Rupestris Metallica and Rupestris St. George. The vines on the latter thus far have yielded 12 lbs. per annum, as against 9.5 lbs. for the former.

On its own root, it has proved an exceptionally heavy bearer, ranking second with Black Ferarra first. The average is 18 pounds per vine. The vine is luxuriant in growth, averaging about 4 feet annually. It is somewhat tender and usually suffers from the winter frosts.

The big fault with this grape is that it does not ripen evenly on the bunch. Season usually just at frost time.

**Fehr Zagos (V. Vinifera), 1900.**

It was not until five years after planting that this variety came into bearing. The first crop was very small, but the second one averaged 10 pounds per vine. The plant is a luxuriant grower, averaging about four feet.

The fruit is greenish, thin skinned and delicious, being of the highest quality and flavor. It is, however, very susceptible to mildew, and the showers occurring during the time when it is ripe cracks the fruit much. Season September 15 to October 15.

**Flame Tokay (V. Vinifera), 1900-04-09.**

Cold winter weather kills about 40 per cent of the canes of this variety. As a result, the crops are irregular and light, amounting to 4.5 lbs. per annum on its own root.

This is one variety that yields better on the American roots. Grafted on Rupestris Metallica the yields have averaged 8 lbs. though the actual growth of the vines is only 3½ feet, compared with 4 feet on its own root.

These are good shipping grapes and for this reason a vineyard of 2,146 vines was set out in the spring of 1909. The grape leaf hoppers attack this variety severely during the years when they are very bad. Season September 1 to October 10.

**Golden Champion (V. Vinifera), 1902.**

Seventy-eight vines were planted on Plat B. They yielded well, averaging 7 lbs. annually. The vine makes a 3 2-3 foot growth and withstands the winter only moderately well. It
seemed to be more resistant to alkali than most of the other varieties, though it is just as susceptible to injury by hoppers.

The bunches are large and compact, of excellent quality, and make a first class raisin, besides the grape being a good shipper.

**Golden Chasselas (V. Vinifera), 1902, Plat B.**

On account of injury by frost, this variety has not done very well. It makes an annual growth of 4.5 feet and yields 3.6 lbs. per year. The fruit is of good quality, amber in color, but too soft to ship.

**Gros Colman (V. Vinifera), 1902, Plat B.**

An exceptionally hardy variety that is quite resistant to leaf hoppers. It is not an extremely heavy bearer, and yet it has not missed a crop since it came into fruiting. Has averaged 5.25 lbs. annually. The grape is very large, tough skinned and firm, and of fair quality. Bunch is of good size and shape, and compact.

**Hungarian Tokay (V. Vinifera), 1904, Plat D.**

This is grafted on Riparia Glorie de Montpelier and has yielded each year since the second year from planting, averaging 7 lbs. Does not seem to be injured much by leaf hoppers, though they attack it severely.

**Isabella (Labrusca X Vinifera), 1904, Plat D.**

As far as the records indicate, this variety has not shown any special adaptability to the conditions under which it has been grown. Did not fruit until the sixth year from planting, and has averaged slightly less than 4 lbs. The grapes are rather small for this variety. It is growing on its own root and Riparia Glorie de Montpelier.

**Jarvis (V. Vinifera), 1904, Plat D.**

This is growing on Riparia Glorie de Montpelier and has shown itself to be very well adapted to these conditions, not being materially affected with hoppers. It has yielded 8 3-4 lbs.
annually. The bunches are very large, the grape medium in size, greenish in color, globular, tender flesh and skin, has four large soft seeds. Though the fruit is not of the very best quality, the yield makes up for this.

This variety originated from seeds imported from England by George Jarvis, and since then grown by the Southern Utah Experiment Station. They are found quite extensively in kitchen gardens in the region about St. George.

**Johannesburg Riesling (V. Vinifera), 1902, Plats B and D.**

We have found this variety to be much injured by the leaf hoppers, and just a little susceptible to the winter frost. It has yielded about 4 lbs. annually, and made a growth of 4½ feet. The grapes are delicious, with a very tender skin, and are much eaten each year by bees. The raisin from them is rather undersized, though of good quality.

**Downing (V. Vinifera).**

One hundred fifty-eight vines were planted in 1900 on Plat C. The vines grow about four feet each year, but are unable to pass the ordinary winter without injury, the damage from freezing ranging as high as 90 per cent. Only one full crop was secured on Plat C; this is recorded as 20 lbs. per vine, on parts of two rows, while the rest averaged only 3 lbs. The fruit is of average quality.

**Lady Finger (V. Vinifera), 1904, Plat D.**

The ten vines of this variety have not shown any adaptability to the conditions here. They have invariably frozen down each winter and have usually produced small clusters of half dozen grapes as a “second” crop. They have made an annual growth of four feet.

**Malaga (V. Vinifera), 1906, Plat D.**

This has yielded but a very small amount and is much like the Muscat grapes in color and size, though lacking the musky flavor. It has grown about 4 feet annually.
Muscat of Alexandria (V. Vinifera), 1900, 1904.

The first vines of this variety were planted in 1900 on Plat C, making a recorded yield of 7 lbs. per vine during the years it yielded, from 1902 to 1907.

In 1904, a lot of 8 rows, 44 vines to the row, was planted, one row being tongue grafted on Riparia, a phylloxera resistant root. An additional row was grafted on to Solonis, another resistant root, two years later, and in 1906 22 vines were grafted on Rupestris St. George, making a total of 418 vines of this variety planted and now bearing. They have yielded on the above lot an average of about 7½ pounds per year, showing a slight increase over the lot planted on the heavier ground in 1900 on Plat C.

This variety has proved to be hardy enough for this climate, 10 per cent having been lost from freezing the first winter following planting, but in the succeeding years it stood the frost well. It is very subject to crown gall, many of the plants being badly affected, some of which have already succumbed.

Muscat Bowood (V. Vinifera), 1906.

None of the vines of this variety are on their own roots, the 22 on trial having, in 1906, been grafted on Rupestris St. George roots, the second year after they were planted. Up to 1909, there are no recorded yields, though there is mention of their having yielded a small amount of fruit. They are less hardy than the M. of Alex., 20 per cent winter killing the first year and many have frozen down since, though not being killed outright.

Muscat Gordo Blanco (V. Vinifera).

One hundred eighteen vines of this variety were planted in 1900 on Plat C. About 18 per cent winter killed the first year, but they suffered less in succeeding winters. They did not do so well as some of the other varieties of Muscats, making an average annual growth of about 3 feet and yielding on an average of 6.4 lbs. per year.
FRUIT VARIETY TESTS.

Niagara (*Labrusca X Vinifera*).

Ten vines were planted in 1906, but of these only seven are now living. They bore a few grapes the fourth year from planting, and in 1910 produced 1.5 pounds per vine. They have made slightly less than three feet annual growth. The climate here is too hot for this grape to reach its perfection.

Purple Damascus (*V. Vinifera*).

Seventy-eight vines were planted in 1900. They have proved quite susceptible to frost—the first winter 25 per cent freezing down, and the next 65 per cent. After that they seemed to do well. They averaged $\frac{7}{2}$ lbs. of delicious fruit, and made an average annual growth of 2 7-8 feet.

Royal Muscat (*R. Muscadine*) (*V. Vinifera*).

One hundred eighteen vines planted in 1900 on Plat C. They are quite hardy, but 9 per cent freezing down first and less than 5 per cent the second winter. They have not proved themselves regular nor prolific bearers, yielding but an average of 1.75 lbs., and this only about half the years after reaching bearing age. The fruit is mediocre in size and quality, and the vine grew only 18 inches per annum.

Sable Kanski (*V. Vinifera*).

Eighty-seven vines were planted in 1902 on Plat B. They did not make a favorable record, as they were very much subject to winter frost injury, and have made an average annual growth of about 22 inches, and yielded an average of 3 lbs. the second year from planting. No yields are recorded for the succeeding years, except in 1907, when one row of 39 vines is credited with 5 lbs. per vine. The grapes themselves are firm, large, and well colored, and should prove excellent shippers. They also make excellent raisins which excel in size and appearance, being also of good quality.

Sultana (*V. Vinifera*).

Ten of these planted in 1906 on Plat D yielded a few grapes the third year from planting, and the next year a good crop of
10 pounds. The average, however, for its bearing years is 5 3-4 lbs. Makes an annual growth of 3½ feet, and seems perfectly hardy. It does not, however, promise to excel or even equal the Thompson Seedless, either in quality or yield for this section.

**Thompson Seedless (V. Vinifera).**

One hundred thirty-seven vines were planted in 1900 on Plat C, 37 in 1902 on Plat B on Rup. St. George roots, and in 1904 444 more on Plat D, including 56 on Rup. St. George and 44 on Riparia a Grandes Feuilles.

Those in the first planting made a record of 12 lbs. average yield and an average growth of 3 feet.

The Rupestris St. George planted in 1902 were grafted in the spring of 1904 to Thompson Seedless. Two years after a few grapes were produced and in the following year the yield was 4.5 lbs.

Those on their own roots in the last planting averaged 13.85 pounds per vine, and grew 4 feet annually.

Those on the Rup. St. George on Plat D were grafted in 1905, and came into bearing in 1907-8, yielding annually 4.45 lbs.

The a Grandes Feulles roots were grafted in 1905 and came into bearing two years later, yielding 4.1 lbs. annually, and making a growth of about 4.5 feet.

Thus far the vines on their own roots have proved the more profitable in yield by nearly 3 to 1, and of the two resistant roots the Rup. St. George yields slightly more. From the vines on either root the grapes are much smaller than those on their own roots, and the wood growth especially on the Riparia a Grandes Feulles excessive. All were affected in about the same degree by the seepage conditions.

**Vergennes (V. Labrusca).**

Ten vines planted in 1906 yielded a few grapes in 1908 and 1909, and 1.3 lbs. in 1910. They have grown 3 feet annually, but thus far are not entitled to special mention.

**White Corinth (V. Vinifera).**

Ten vines planted in 1906 yielded a few grapes in 1909, but none the following year. They have made an annual growth of
about 3 feet and stand the winters. They are the only typical currant grape we have, and bid fair to do well.

**Worden** (*V. Labrusca*).

Ten vines planted in 1906. These bore a few grapes in 1909, and 2.6 lbs. in 1910. Make an annual growth of 3 feet, but thus far are not especially meritorious. The seeds are excessively large.

**Zante** (*V. Vinifera*).

One hundred eighteen vines of this variety were planted in 1900 on Plat C, and in 1902 seventy-eight more were planted on Plat B. The first planting averaged 12.4 lbs., the second 6.1 lbs. per vine annually. They suffered from the winter weather at first, but later withstood the freezing. This variety seems to require a longer season than we have here, as the grapes were never fully ripe when frosted in the fall, though after frost they were quite palatable. They made an annual growth of slightly over 4½ feet.

**Zinfandel** (*V. Vinifera*).

The same number of these were planted in 1900 and 1902 as of the Zante, but they have not made as good a record, as they were irregular in bearing. They averaged about 8 lbs. per vine, exhibiting a tendency to produce two crops annually. Vine growth was about 3½ feet, unless they winter killed, when the growth the succeeding season would be about five or six feet.

**REVIEW OF GRAPES.**

Generally speaking, the standard American grapes of the northern sections do not thrive here. While the Isabella has been practically a failure on the Experiment Farm, yet it grows exceedingly well on the soil in most parts of southern Utah, and will probably continue for some time at least to be the most popular grape of this type.

However, the Agawam, Gros Colman, and Goethe are at least equal and in some respects superior to the Isabella, and if better known would probably largely replace it, especially as they have a range of season from almost earliest to the latest.
Of the European grapes, the same unanimity of opinion may not exist. Of the shipping grapes, thus far the Cornichon has by a considerable margin held the lead, with the Muscat of Alexandria second. However, the Golden Champion would probably be equal to the latter, as it is equally good or better in shipping qualities, besides having a much finer shaped bunch and yielding much more per vine.

The Flame Tokay thus far has not come up to its reputation, the vines freezing down more or less, and the grapes not ripening uniformly on the bunch, besides the birds and bees attack them severely.

The Black Ferarra would be a good late shipper if the bunches were better filled, but on that account cannot be recommended highly. Of the dessert grapes the Thompson Seedless is quite well liked but does not ship very well. The Black Malvoise is one of the most delicious of our grapes and for the home garden certainly ought to be planted. The Blue Spanish, Early Madeline, Fehr Zagos, and Muscat of Alexandria are also much liked.

Of the seedless raisin grapes the Thompson Seedless is without question the best, and in the other class the Muscat of Alexandria, Golden Champion, Fehr Zagos, Johannesburg, Riesling, Sabal Kanski and Jarvis will rank in about the above order.

The wine grapes are not so easily separated because no work has been carried on at the Southern Utah Experiment Farm, so only the results obtained in other sections can be given. We can say, however, that there is no horticultural industry that would pay as well in southern Utah as a commercial winery. There are thousands of acres available that with three irrigations a year would grow the finest of grapes, either for raisin or wine making. And if the industry was placed on a commercial basis—that is, the company operating the winery buying the grapes as a sugar company buys beets—there would not be the demoralizing tippling that formerly cast a shadow over the communities in this section during the time when each grape grower was a wine maker.
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- Irrigated Lands
- State Roads
- County Roads