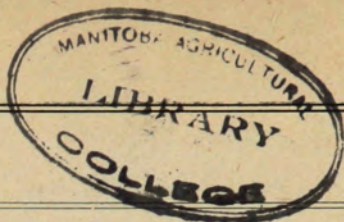


Bulletin 223



February, 1917

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The Agricultural Experiment Station  
OF THE  
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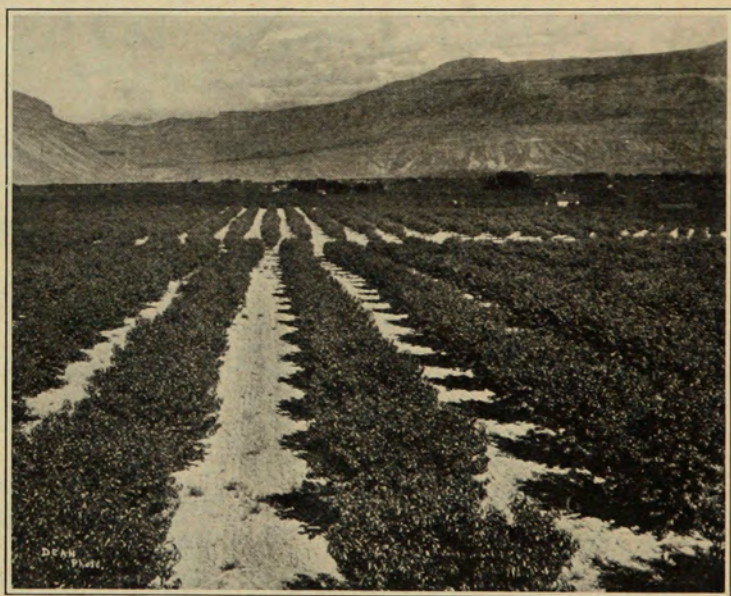
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A FRUIT SURVEY OF MESA COUNTY

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BY

E. P. SANDSTEN, T. F. LIMBOCKER and R. A. MCGINTY



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A Birds-Eye View of a Peach Orchard Near Palisade, Colo.

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# The Colorado Agricultural College

FORT COLLINS, COLORADO

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# A FRUIT SURVEY OF MESA COUNTY

BY

E. P. SANDSTEN, T. F. LIMBOCKER and R. A. MCGINTY

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Ten years ago, fruit growing in Grand Valley was very profitable. Peaches often netted the growers \$1.25 per box, while apples and pears cleared \$2.50 per box. It was like picking money off of the trees. The growers were getting rich and real estate men were in their glory. It was an easy matter to get easterners to buy fruit land at \$1,000 or more per acre, for, as the real estate men pointed out, one year's crop might pay for the land. Hundreds of men from all walks of life invested their money in fruit land, speculation was rife, many companies were formed for planting orchards, and thousands of fruit trees were set out on land wholly unsuited for fruit growing. Bearing orchards were divided into five and ten-acre tracts and sold to persons, most of whom were inexperienced in fruit growing. Many of these new orchardists sat back in their easy chairs to watch the dollars grow. Others, uninitiated into the art of fruit growing, did not care for their crops as they should have done. As a result, the fruit became poorer in quality, and not being carefully graded, the demand for Colorado fruit became less. Prices continued to drop until, in the season of 1914, with an enormous crop all over the country as well as at home, most growers lost money on their fruit. Many carloads of fruit were shipped which did not pay for the freight. Thousands of bushels were allowed to drop and rot on the ground. The season of 1915 was a very hard one; with the exception of the immediate Palisade district, practically all of the Valley was frozen out. To make matters worse, prices were poor and very many growers had to give up their orchards. It was rightfully an exceedingly discouraged lot of orchardists which were visited by the writers in the summer and fall of 1915. Most of them were sick of the fruit business and wanted to quit. Some few, however, who had used good methods in growing and marketing their fruit were still making money.

It was with the idea of studying in the field the conditions prevailing there that this fruit survey of Mesa County was made.

## EXTENT OF SURVEY

That part of Mesa County in which the fruit survey was made is the portion of Grand Valley which was irrigated previous to the opening of the Government ditch in 1915. It is about 32 miles in





Apple Harvest in Grand Valley.

length and extends from about 2 miles above Palisade to an equal distance west of Loma. In width it varies from less than a mile at Palisade to about 5 miles at a point about midway between Clifton and Grand Junction. The total area of land within these limits is about 75,000 acres. The elevation of the Valley varies from 4,500 to about 4,800 feet. Nearly every orchard in the Valley was visited and the owner or tenant interviewed personally. Altogether about 1,800 places were listed.

#### PERCENTAGE OF LAND SET TO FRUIT WITHIN LIMITS OF SURVEY

Nearly all of the bearing orchards of the Valley, except on Orchard Mesa, southeast of Grand Junction, and a few scattering orchards, are planted north of the river. The percentage which is planted to fruit trees between the river and the highest irrigation canal on the north is, approximately, 70% in the Palisade District, 56% in the Clifton District, 20% in the Grand Junction District, 12% in the Fruita District, and 13% in the Loma District. The

Orchard Mesa and Redlands Mesa orchards are, except those mentioned, young, and most of them have never borne. On account of the uncertainty of irrigation water, many of them have been neglected and are in poor condition.

### TIME OCCUPIED IN SURVEY

The field work of this survey was begun early in the summer of 1915 and finished late in the fall. The data were carefully worked up at the Agricultural College in Fort Collins during the winter. Due to the enforced absence of the junior author during the summer of 1916, the publication of the results was delayed several months.

### METHODS USED IN SURVEY

In order to get detailed information in regard to the situation in Mesa County, very complete blank forms were prepared for use in the survey. See Page 6 for reproduction of this form. The fruit growers were visited personally and the information received from them recorded on the blanks. Care was taken to get accurate answers to the questions asked. The blanks were filed away in order until ready for tabulation. In working up the notes, caution was used to put the orchards in their proper sections. Thus it was possible to determine with a fair degree of accuracy the acreage and kinds of orchards located in each section of the Valley. The trees were divided into age classes, to show approximately their state of production. The four classes used were, six years and under, classed as non-bearing trees; seven to ten years, eleven to fifteen years, and sixteen years or over.

For convenience, the Valley was divided into five districts by the range lines, and each named after the town located in it. That part of the Valley lying east of the range line which runs about one and a half miles east of Clifton, is called the Palisade District. That in Range 1 East, or lying between the aforesaid range line and that running just west of the Teller School of Agriculture and Mechanic Arts, about one mile east of Grand Junction, is called the Clifton District. The Grand Junction District comprises that land in Range 1 West and extends westward from the above range line to that lying just west of the Ute switch of the Denver & Rio Grande railroad. From this range line to that one mile west of Fruita is the Fruita District, and the fifth, or Loma District, extends from the latter range line to that just west of the town of Mack. The northern and southern limits of these districts are marked by the highest irrigation system on the north and south sides of the river. These districts are clearly shown on the map.

*Fruit Survey of Mesa County, Colorado*

T. \_\_\_\_\_ R. \_\_\_\_\_ Sec. \_\_\_\_\_ Lot \_\_\_\_\_

No. of acres in fruit..... No. of trees..... Distance to Station.....  
 SOIL S. Loam.... Clay.... Silt.... Adobe.... Distance to water table....

## APPLES

No. of acres..... No. of trees..... Age of trees..... Condition of trees.....  
 Variety..... No..... Var..... No..... Var..... No..... Var..... No.....  
 Variety..... No..... Var..... No..... Var..... No..... Var..... No.....  
 Variety..... No..... Var..... No..... Var..... No..... Var..... No.....

## PEARS

No. of acres..... No. of trees..... Age of trees..... Condition of trees.....  
 Variety..... No..... Var..... No..... Var..... No..... Var..... No.....

## PEACHES

No. of acres..... No. of trees..... Age of trees..... Condition of trees.....  
 Variety..... No..... Var..... No..... Var..... No..... Var..... No.....

## PLUMS

No. of acres..... No. of trees..... Age of trees..... Condition of trees.....  
 Variety..... No..... Var..... No..... Var..... No..... Var..... No.....

## APRICOTS

No. of acres..... No. of trees..... Age of trees..... Condition of trees.....  
 Variety..... No..... Var..... No..... Var..... No..... Var..... No.....

## CHERRY (Sour)

No. of acres..... No. of trees..... Age of trees..... Condition of trees.....  
 Variety..... No..... Var..... No..... Var..... No..... Var..... No.....

## CHERRY (Sweet)

No. of acres..... No. of trees..... Age of trees..... Condition of trees.....  
 Clean culture..... Cover crops..... No. of irrigations.....  
 Cost of Prod. per box,—Apples... Pears... Plums... Cherry (So)... (Sw)...  
 Acreage increased or decreased,—Apple... Pear... Peach... Plum... Cherry..  
 Is fruit growing profitable?..... Which fruit?.....

## SPRAYING

No. of times,—Apples..... Pears..... Peaches..... Plums..... Cherries.....  
 How much poison per 100 gal. of water..... Does it pay?.....  
 Cost of spraying..... Per cent clean fruit.....  
 Would special or general farming be profitable with fruit growing?.....  
 What can C. A. C. do to aid the fruit industry?.....  
 Remarks:.....  
 .....

The data for these districts are given separately throughout the bulletin for comparison.

After the data were compiled, such increases to the total acreage, total number of trees, etc., were made as were deemed necessary to allow for orchards missed. These varied from 1% to 4½% and are fairly accurate. The figures as listed in the tables are, we believe, as nearly correct as it is possible to make them.

Only the more important of the data collected are given in the bulletin. For instance, of more than 100 varieties of apples, only six are discussed and 21 others mentioned. Many varieties, especially of apricots, plums and cherries, were unknown and were so listed.

### TOPOGRAPHY

In general, the Valley is quite level. In fact, portions are too level for good drainage. It slopes westward with the direction of the river, from the north, southward to the river, and on the south side, northward to the river. While the Valley is level, there are found in many places ridges and depressions, the former containing a loamy soil excellent for fruit, and on which are found some of the finest orchards in the Valley. The lower places generally become seep holes under irrigation, as water collects from the higher adjacent lands. On the whole, the Valley possesses natural conditions for adequate drainage, when developed.

### CLIMATIC CONDITIONS

The Grand Valley, being located on the western slope of the main range of the Rockies, enjoys a milder climate than a similar location and elevation on the eastern slope, and, as a consequence, the Valley produces a great variety of fruit to perfection. The annual rainfall is less than on the eastern slope, being only 7 or 8 inches per annum. This small rainfall makes irrigation an important factor in fruit growing. While the climatic conditions are favorable for the growth of all standard varieties of temperate-zone fruits, the occurrence of belated spring frost makes for a short crop year now and then.

On the whole, it can be said that the Valley is very well adapted for commercial fruit growing from a climatic point of view.

### SOIL

The soil of Grand Valley is of a silt formation, rather heavy in texture, approaching the adobe type. A few ridges and a small district adjoining the river are more sandy and loamy, but in general the soil is heavy and not easily managed. While the soil of

Grand Valley is well adapted to the different kinds of fruit, local soil problems have arisen that need special attention from the growers. The most important problem is that of niter accumulating in the orchard soils. For a technical discussion of this problem, see Bulletin No. 193 of the Colorado Experiment Station.

A full discussion of the niter problem from the orchardist's point of view will be given under the head of "cover crops."

### DRAINAGE

While the natural drainage of the Valley is good, yet, due to liberal irrigation, much of the land occupying somewhat depressed portions of the Valley is suffering from seepage and standing water. The water-table, on the whole, for a considerable portion of the Valley has been raised to within 10 feet of the surface, and in some parts of the fruit sections it is less than 5 feet from the surface. This raising of the water-table has a decided influence upon commercial fruit growing in the Valley, but the difficulty bids fair to be eliminated by a system of drainage to be installed through the whole length of the Valley.

### ALKALI

Like most irrigated sections, the Grand Valley has a considerable acreage of what might be termed alkali land. These alkali areas are not uniformly distributed, but occur in different sections, especially where there has been a large amount of seepage water, which upon evaporation deposits the alkali on the surface. These alkali areas are particularly noticeable east and west of Grand Junction and on the low-lying land close to the river. Many of these alkali areas are unsuited for fruit growing, and some of them are so heavily impregnated with alkali as to make them useless for all agricultural purposes. Undoubtedly the larger portion of these alkali lands could be reclaimed by heavy washing, if sufficient drainage is provided for them. The alkalis are all white ones, ex-drainage is provided for them. The alkalis are all white ones. Black alkalis or carbonates, so far as is known, do not occur in the Valley.

### DISTANCE FROM STATION

For the purpose of learning the average distance fruit had to be hauled in shipping, the distance to the nearest shipping point was recorded. It was found that the average distance to the station for all orchards of the entire Valley was 1.55 miles. For the districts separately it was as follows: Palisade 1.2 miles, Clifton 1.25 miles, Grand Junction 1.8 miles, Fruita 1.85 miles. The shipping points used were Palisade, Bridges' Switch, Clifton, Fruit-



vale, Grand Junction, Fruita and Loma on the D. & R. G. railroad, and Hollandville and Hunter stations on the electric railroad between Grand Junction and Fruita.

As this indicates, most of the farms are very close to loading points, doing away with the necessity of long hauls.

### SIZE OF ORCHARDS

The survey reveals the fact that the average size of orchards in the Grand Valley is 8.8 acres; the average for Palisade is 7.0 acres, for Clifton 10.8 acres, Grand Junction 8.5 acres, Fruita 7.5 acres. The average size of orchards in the Loma district could not be obtained, due to the fact that most of the owners of orchards in this district are non-residents and their property is being attended by tenants who have often 100 acres in their care. It is estimated at 10 acres.

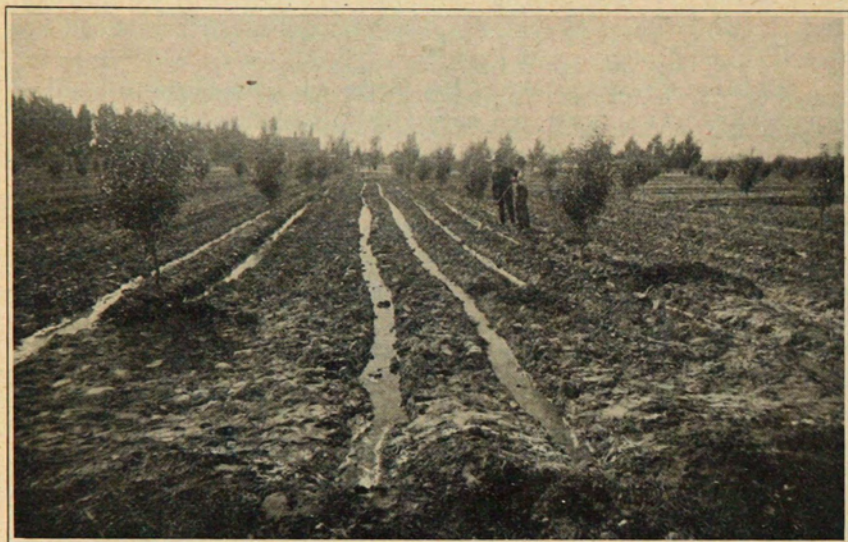
A majority of orchards are of 10 acres or less. Especially in the east end of the Valley are the orchards cut up into small tracts, some of less than 5 acres. It is hardly possible, except in the best of fruit years, to make a reasonable profit from 5 acres of land, when it is all planted to fruit trees, and a bad year is almost disastrous. The necessity of re-adjusting the land to increase the size of farms seems imperative. With the return of reasonable land values, this re-adjustment is practicable.

### IRRIGATION

The problem of irrigation has been a big one. Water has, as a rule, been plentiful and the growers have used entirely too much. The tendency with many has been to let irrigation take the place of cultivation. This has resulted in leaching out of the soluble plant food and puddling the soil so that it bakes and is hard to work. Then, too, it has raised the water-table in many places so close to the surface of the soil that it is impossible for trees to live.

As a general thing, the farmers have irrigated lightly and very frequently, instead of giving thorough irrigations at less frequent intervals. The latter plan results in soaking the ground to a good depth and when followed by cultivation holds the moisture for a long time. It does not puddle the soil, causing it to bake, but accomplishes the desired purpose of supplying plenty of water for the trees better than lighter irrigations.

The statistics gathered show five or six irrigations to be the average number applied for fruit crops. The growers in the Palisade District irrigate somewhat oftener than those in the western part of the Valley. There is also more land under clean cultivation in this district than in cover crops. There are several seepage



Irrigating Scene in the Grand Valley.

areas in the Valley caused from over-irrigation and poor drainage. In many of these, it is impossible to grow anything, and some of them will mire a horse. Many once profitable orchards have been utterly ruined by seepage, and a good many more are doomed unless the needless over-irrigation is discontinued.

The water for irrigation is taken from the Grand River some distance above the main Valley. Naturally, the lower land or the land adjacent to the river was first developed, due to the cheapness in constructing irrigation canals. The upper lands closer to the foothills at Palisade and south of the river are irrigated by water from pumping plants, making the irrigation expensive. The new government project which was completed last year opens up an extensive area of land above the old canals. This will have a considerable bearing upon the land under the old irrigation system. Water is abundant, and, with the exception of that supplied by pumping plants, is cheap.

#### COVER CROPS

The use of cover crops in the Grand Valley is of relatively recent date. Clean culture has been the universal practice throughout the district. With the appearance of the niter troubles and with the gradual burning out of vegetable matter in the soil in many orchards, the decline of trees has been very rapid. A num-





A Peach Orchard at Palsade Showing Methods of Furrow Irrigation.

ber of growers early realized the necessity for a more rational system of culture and are seeding their orchards to some kind of crop that can be plowed under, thus adding the necessary humus to the land.

Alfalfa has been the favorite cover crop in the orchards, but this crop has several drawbacks, the main one being that it is difficult to eradicate after it has been once established. A cover crop should not be kept in the orchard for more than two or three years, after which clean culture should be practiced for an equal period. In other words, a cover crop and clean culture should alternate if the best results are to be obtained.

Medium red clover is used by a number of growers with very satisfactory results. The first crop can be cut and either used for hay or left as a mulch on the ground, the second crop being left uncut, which will help to hold the snow and moisture in the winter. The second year the same method may be pursued except that the second crop should be plowed under, leaving the orchard to be



clean cultivated. Where it is difficult to obtain a stand of clover, oats may be used, but it should be plowed under and not cut for hay. After this has been done for one or two years, it is generally easy to obtain a good stand of clover.

Hairy vetch gives promise of becoming an important cover crop in Grand Valley. This is a biennial plant that should be sown in September and plowed under the following May. It starts to grow in the fall, stands the winter well and makes a heavy mat of green herbage by the last week in May.



An Apple Orchard in Cover Crop of Red Clover, Grand Valley, Colorado.

The use of cover crops has proven beneficial to the orchards in the Grand Valley and the practice should be extended to every orchard. When cover crops are grown, they should be left on the ground to plow under, as hay and fruit cannot both be grown on the same land successfully.

The practice of dividing the orchard into several parts by fences and allowing hogs to run alternately in each gives promise of success where alfalfa or clover are used as cover crops. This permits moving the hogs from one part of the orchard to another when irrigating. The hogs eat up the culls and fallen fruit as well as the cover crop, and their manure is left on the ground, thus adding to the fertility of the soil. This practice is not recommended for orchards in which the trees are small and easily injured by the rubbing and rooting of the animals.

The most serious soil problem in Grand Valley is niter. The presence of a large amount of niter was noticed several years ago

by Dr. Headden and later by Professor Sackett of this station, and these gentlemen have carried on extensive experiments to discover the cause or origin of the niter. These experimentors have clearly proven that the presence and accumulation of the niter in the Grand Valley is of a bacterial origin. The accumulation of niter is much more rapid on lands under a clean culture system, and consequently the orchards were first to suffer from this trouble. In some cases the niter has accumulated to the extent that all vegetation has been killed and the land left entirely barren and unproductive. A considerable percentage of the older orchards were killed and the land left barren through niter accumulations.

The Horticultural Department, about three years ago, undertook to carry on some experiments with the view of eliminating or neutralizing the effect of the niter and making the land produce a normal crop. The results of these experiments show that the niter problem can be handled by the use of cover crops which will protect the land during the summer and by the effect upon the soil of turning under the green materials grown. This method is effective and should be practiced by fruit growers whose orchards are not as yet suffering to any extent from niter trouble. Where the land has gone so bad as to become barren, the only method known by which it can be reclaimed is by washing the soil. The nitrates being soluble in water can easily be washed out by heavy flooding or heavy irrigation. This method was tried on a piece of land that was entirely barren and in two years the land was entirely reclaimed and produced normal crops. This washing or flooding of the land calls for drainage to carry off the surplus water. It also requires that the land should have at least a gentle slope to permit the water to run off freely. This method of reclaiming niter land is not applicable to land in growing orchards. The cover crop method is the only safe and rational way of overcoming niter accumulation, and it is a rational method of orchard management that every intelligent fruit grower should follow. In other words, the niter problem should not occur if rational methods of orchard management are followed out.

### COST OF SPRAYING

The mean of 34 estimates on the cost of spraying per 200 gallon tank is \$2.05. For the cost per acre per season of arsenical sprays, 41 estimates gave an average of \$20.00. This, divided by 5.85 (the average number of sprays per season for apples for the Valley), gives \$3.40, or the average cost per acre for one applica-



tion of arsenical spray. The cost per spray of lime-sulphur, the mean of 95 estimates, is \$6.65 per acre.

There was much variation in the answers given for the spraying data. Many of the orchardists have absolutely no idea of the cost of this work.

### INCREASE AND DECREASE OF ACREAGE

The past five years have seen considerable decrease in the acreage of orchards in the Grand Valley. It is safe to say that during this period at least 2,500 acres of orchards have been pulled out. Various reasons are assigned for the removal of the trees, chief among them being poor prices, seepage and neglect.

The decrease in acreage has affected the apples most severely, and the loss has been heavier in the older districts. The following estimates, based on actual figures, give an idea of the amount of orchard pulled out between 1911 and 1915. These estimates are, probably, in most cases, low. Palisade shows a decrease of about 150 acres of peaches and an increase of 50 acres of apples and 75 acres of pears. The Clifton District has lost 400 acres of apples and 450 acres of peaches, the acreage of pears remaining about the same. In the Grand Junction District the acreage has been diminished by 600 acres of apples, 150 of pears, and 50 of peaches. Fruita shows a loss of 750 acres of apples, and Loma has a decrease of 100 acres of apples.

In some few cases, good bearing orchards have been pulled out, but in most cases it was better that the trees were removed. The Valley as a whole would be vastly improved if all the ill-planted, seeped, neglected or otherwise unprofitable fruit trees were removed and a lot of inferior fruit thus kept off the market.

Fruit growing, like all other agricultural industries, thrives best only under favorable conditions. One cannot profit from an orchard under adverse conditions. When it is seen that fruit trees will never yield a fair return, they should be taken out and the land devoted to other crops.

### YIELD

For the years 1911 to 1915, the average number of acres of bearing orchard was about as follows: Apples, 6,000; pears, 1,100; peaches, 1,800. Assuming that 90% of the fruit grown during this period was shipped out of the Valley, the average yield for the Valley would be about 800,000 boxes of apples, 60,000 boxes of pears, and 1,150,000 boxes of peaches. This would give an average yield per acre of about 135 boxes of apples, 145 boxes of pears, and 640 boxes of peaches.

It is absolutely impossible to obtain accurate figures on the number of acres of bearing orchard or the yield per acre. No claim of authenticity is made for these data on yields. Yet, though they are merely estimates, they give some idea as to the probable yields and are as nearly correct as can be determined from the data at hand.

### THE COST OF PRODUCTION

One of the questions asked the growers was the cost of production per box of the different fruits. Many of them had absolutely no idea of the cost, and others had pretty close figures on this. While there is considerable variation in the estimates given, the mean is no doubt very close to the actual cost of the fruit. The averages of the estimates for the cost of fruit f. o. b. their shipping point, including all expenses, was as follows: Apples, 61.2c per box (the average of 61 estimates ranging from 40c to 86c); pears, 60.5c (average of 37 estimates, varying from 40c to \$1.00); peaches, 31.2c (average of 78 estimates, varying from 20c to 43c).

It is quite evident that the growers must receive at least 65c per box net for apples and pears in order to make interest on their investment. At an average of \$1.00 per box a fair profit can be made. At this price they should reach the consumer at \$1.50 to \$2.00 per box, which is not too much to pay for first-class fruit.

Peaches should net 40c to 50c per box, making them retail at \$1.00 to \$1.25 per box.

### MARKETING

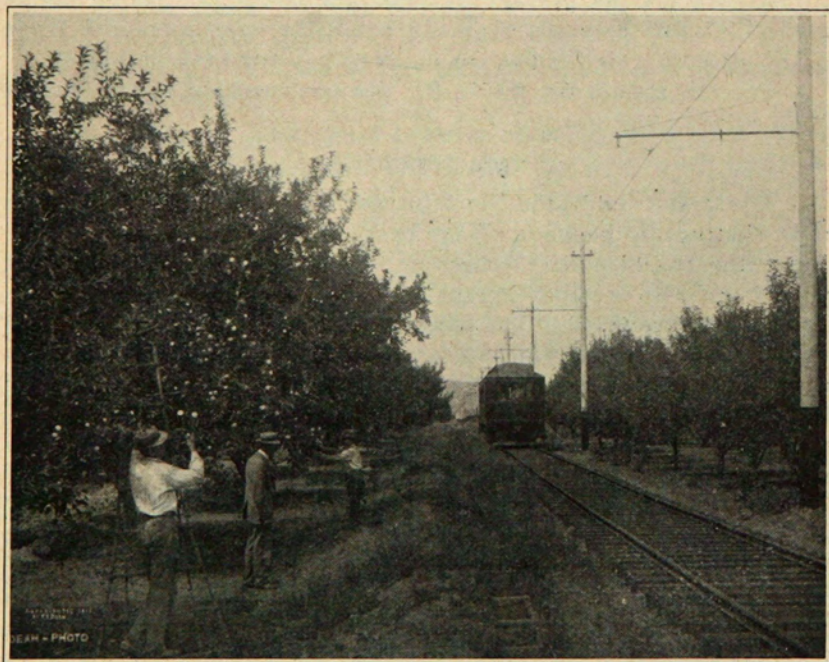
The greatest trouble the fruit growers have to contend with is the marketing problem. This has, for several years, been causing unlimited trouble. Numerous methods of selling fruit have been tried and, without exception, all have been found wanting. Experience has proved that co-operative selling associations offer the most satisfactory solution to the problem. This system of co-operative selling originated in Grand Valley and has been tried here a number of times, but with varying degrees of success. When fruit was bringing good prices things went all right, but with the drop in price, trouble brewed.

There is one big defect in the system—the average farmer will not co-operate. Whenever he sees a chance to get a little more for his fruit than he is getting through the association, he will do so, regardless as to what happens to his associates. It is to this failing that the success of unscrupulous commission agents is due. The plan of these men is to promise the farmers a little more for their fruit than their associates are getting for it. The farmers usually let the agent take their fruit. If they are too skeptical

and hesitate to leave the association, the agents advance a certain amount per box on the fruit, the balance to be paid when the fruit is sold. There are many instances in which the growers never hear from the agent again; in others, where they receive a bill for the freight, and still others where money has been advanced for the fruit, they get a bill for a refund on the payment advanced. This they are often compelled to pay.

The strangest thing of all is that often the very men who are defrauded in this way are "taken in" again the next year. It is easy to see that under these conditions a co-operative association cannot be successful.

The consignment system has not proved very satisfactory. In any carload of fruit not strictly graded, there will be boxes which are below standard. The commission men, finding this, refuse to handle the consignment, except at a lower grade. Oftentimes consignments are reported in bad condition when they are as good as represented. The owners must either allow the fruit to be marked down or turn it over to someone else. This is not very easy to do when they are several hundred miles away. Sales on an f. o. b.



Modern Method of Transportation. The Apple Crop is Handled by Interurban Electric System which Connects with the Railroad.

basis would do away with this practice. Even where commission men are honest, there is much complaint. Fruit is often not up to the standard, and when the market is full, as it frequently is, they cannot sell the fruit at good prices. The commission man then gets the blame for poor prices and is accused of dishonesty.

Many growers have tried the plan of selling their fruit direct, or of shipping it to some town and selling it from the car. There have been varying degrees of success with this system of selling. Some men have netted good returns from it, while others failed utterly. Altogether, the plan is not satisfactory.

Yielding to the pressure from many growers, the Grand Junction association tried out the plan of sending men to the more important middle western markets and shipped fruit to them for distribution. The belief, held by many orchardists, was that these men could watch the market more closely and hence dispose of the fruit to much better advantage than the association manager in Grand Junction. The plan fell far short of the expectation of its advocates and was declared by the association to be a failure.

The ultimate solution of the marketing problem will in all probability be a more closely co-operative association through which the members alone may ship their fruit without extra charges. The members must agree to sell all of their crop through the association, and any fruit growers who are not members must pay considerably more for having their products marketed by the organization.

Another factor which would doubtless work a benefit in marketing would be the establishment of community packing houses. These would be located in the most accessible places and would be sufficiently numerous to take care of all the growers without delay or long hauls. These packing houses would be under the direct supervision of the association representatives who would see that all growers received fair and impartial treatment and that the fruit was strictly graded and carefully packed. This would insure uniform packages and facilitate f. o. b. sales.

Besides, with the work carefully done, the association would gain a reputation for good fruit and the fruit would largely sell itself on its own name. Under the present system, every man packs his own fruit and there is little uniformity in the packages. Such lack of conformity leads dealers to distrust the quality of produce in any grade, and hence refrain from buying except on consignment.

The shipping of standards, or fruit below the second grade, has worked a great detriment to the fruit industry. It would be

far better not to ship this fruit at all, as it competes with the better grades on the markets.

The shipping of second-grade fruit in baskets will most likely become more popular with the growers in the future, as it affords a cheaper method of putting up the fruit, and the baskets themselves are much more useful to the ordinary consumer than the boxes. This should be especially true with apples and pears. Another advantage in marketing in baskets is that the consumer can see the quality of the product he is getting and it sells itself on sight more often than when packed in boxes.

### FARM EFFICIENCY

There are very few fruit growers in Mesa County who keep any kind of records of their transactions. Thus it is almost impossible for them to know where they are gaining or losing money, what the different operations cost, or where they could save money.

Neither do most growers follow any system in their work, but go at their work blindly, often doing things several times where one time properly done would suffice. The men who have been making money during the low-price period have, in nearly all cases, been men who study their business and keep a set of books to show where they stand financially. They are also usually men who are ready to listen to suggestions for improvement in their methods.

It is very important that a set of books be kept and a system worked out which will give the greatest possible efficiency. The aim should be to avoid all waste, and arrange the work so that it will not conflict and so that there will be always something to do. This will materially add to the profits of the farm.

### DIVERSIFICATION

The question of diversified farming arises in connection with fruit growing, especially in view of the recent poor years for fruit. The majority of farmers in the Valley, when interviewed, were of the opinion that diversification would pay in connection with fruit growing. With land at its present prices and cut up in tracts of ten acres or less, diversified farming is hardly practicable. However, there is little doubt that with 20 acres or more the vast majority of growers would benefit by diversifying.

There are a few of the best fruit growers who can always make more money with fruit than anything else. These men are the exception and not the rule. Every grower should at least have a cow, a few pigs and chickens, and a small garden patch. The first cutting of alfalfa or clover may be used for hay where there is a good stand in the orchard, but no more should be taken. Many



farmers have tried the growing of special crops such as canteloupes and small fruits, and some of them have been very successful in this venture.

Regarding the Valley as a whole, there are too many men in the orchard business who are not fruit growers, and too many tracts of fruit trees which are not orchards in a real sense, for the business to thrive except under extraordinary conditions.

More land devoted to alfalfa, sugar beets, grain, and stock and less to fruit growing, would undoubtedly mean better success for most of the Grand Valley farmers.

### SMUDGING

#### (Orchard Heating)

The concensus of opinion among orchardists in Mesa County is that the attempt to ward off frosts by smudging (building fires in the orchard to raise the temperature) is not a paying proposition. Practically all systems of smudging have been tried with varied results, but the practice has been abandoned by most of the growers.

The trouble is that the conditions must be very favorable for effective smudging. At best, the temperature can be raised only a few degrees and when the frost is accompanied by a wind, it is almost impossible to do any good. As a safeguard, many nights of wearisome toil are often spent in smudging, only to find that the frost was not hard enough to do any appreciable damage. Under any conditions, smudging is a very disagreeable, man-killing task, as well as being expensive. When one spends several nights in smudging only to be caught by a late frost, or to find that his neighbors who did not smudge have as much fruit as he, he very seriously questions the utility of the practice.

Disregarding all worry and hard work, it is doubtful whether orchard heating is profitable. If one is not situated where fruit growing is fairly safe without smudging, the advisability of the business is exceedingly questionable. One had better either raise other crops, or move to a safe fruit-growing country. There are too many precautions that must be taken to successfully grow fruit in any district without adding that of constant danger from frost.

The continuance of smudging in commercial fruit growing will very likely be limited to vicinities where there are infrequent killing frosts and to the larger orchards. As a general practice, it appears to be a thing of the past.

### TREE GROWTH IN THE GRAND VALLEY

The vigorous growth of fruit trees in the Valley indicates that the climatic and soil conditions are favorable for the development

of sturdy and productive trees. The trees come into bearing early, and, with most varieties, large annual crops are produced.

The heavy wood growth makes the problem of proper pruning an important one, and this phase of fruit growing in the Valley has, in most cases, been given less attention than it deserves, for it is a well recognized principle in fruit growing that a tree, in order to produce the maximum crop of first-class fruit, must be reduced in wood growth so as to permit a free circulation of air and light through the tree and to produce fruit of sufficient size. If pruning is not systematically performed, the trees become too heavy in wood growth, which, in turn, will produce a large number of small, poorly colored fruits. In general, it should be said that fruit growing in the Grand Valley represents the advanced process in American fruit growing.

There is danger of neglect during a year of failure when the grower does not feel like spending money on the proper care of his orchard because there is no income. This is a mistaken practice, because it is universally recognized that no agricultural crop will suffer greater permanent injury from neglect than a fruit orchard. A few years of neglect will, in most cases, completely ruin the orchard and spoil it for future profitable crops.

### SOME POINTS REVEALED BY THE SURVEY

The fruit survey shows that the development of the fruit industry in the Valley has been along logical lines, so far as the adaptation of the different kinds of fruit to the soil and climatic conditions is concerned. In the Palisade District, which occupies the upper end of the Valley, the peach industry predominates. This is natural because of the topography of this section. The Valley at this point is narrow and is shaped like a crescent, protected on the north and northeast by high bluffs, which retain the day's heat and make this part of the Valley practically frost-proof. The soil is of a sandy loam nature and admirably adapted for the growing of peaches, sour and sweet cherries and pears.

The Clifton District, immediately below Palisade, is the largest apple-producing section of the Valley. The Valley broadens out immediately after leaving Palisade, yet it is sufficiently close to the mountains to afford some protection against belated spring frosts. The soil bed is intermediate in character between a heavy adobe and loam, and is admirably adapted for the growing of apples. The topography of this section of the Valley provides for a better system of air and water drainage than sections below. The section immediately surrounding Clifton is planted almost solidly to fruit trees.

The Grand Junction section occupies about the center of the Valley. This section is more uniformly level and suffers perhaps more from lack of drainage of both air and soil. Still there are several elevated portions of this section known locally as fruit ridges on which are located some of the finest orchards in the Valley. The soil in this section is, with the exception of the fruit ridges, heavy adobe and quite difficult of handling. The Fruita section follows the Grand Junction District in order westward. This section has a large acreage of sandy loam soil that is capable of producing a great variety of fruit, potatoes and vegetables, but, due to its position in the Valley, the orchards are subject to belated frosts which often cause the total or partial loss of a crop. A considerable portion of the low-lying land has suffered from lack of drainage. The Loma District occupies the most westerly portion of the Valley and is less developed. Although over 1,300 acres of orchard have been planted, the greater portion of it is in young trees. This section was mostly set out six to eight years ago during the boom period.

#### EXPLANATION OF MAP OF FRUIT BELT OF GRAND VALLEY

The map on Page 22 is designed to show the relative density of orchard in each square mile which contains over five acres of fruit land. This map is adapted from the United States Reclamation Service map of the Grand Valley Irrigation Project, and shows most of the land watered by the new Government canal, as well as by the older ditches. The various markings show how extensive the orchards are in each section.

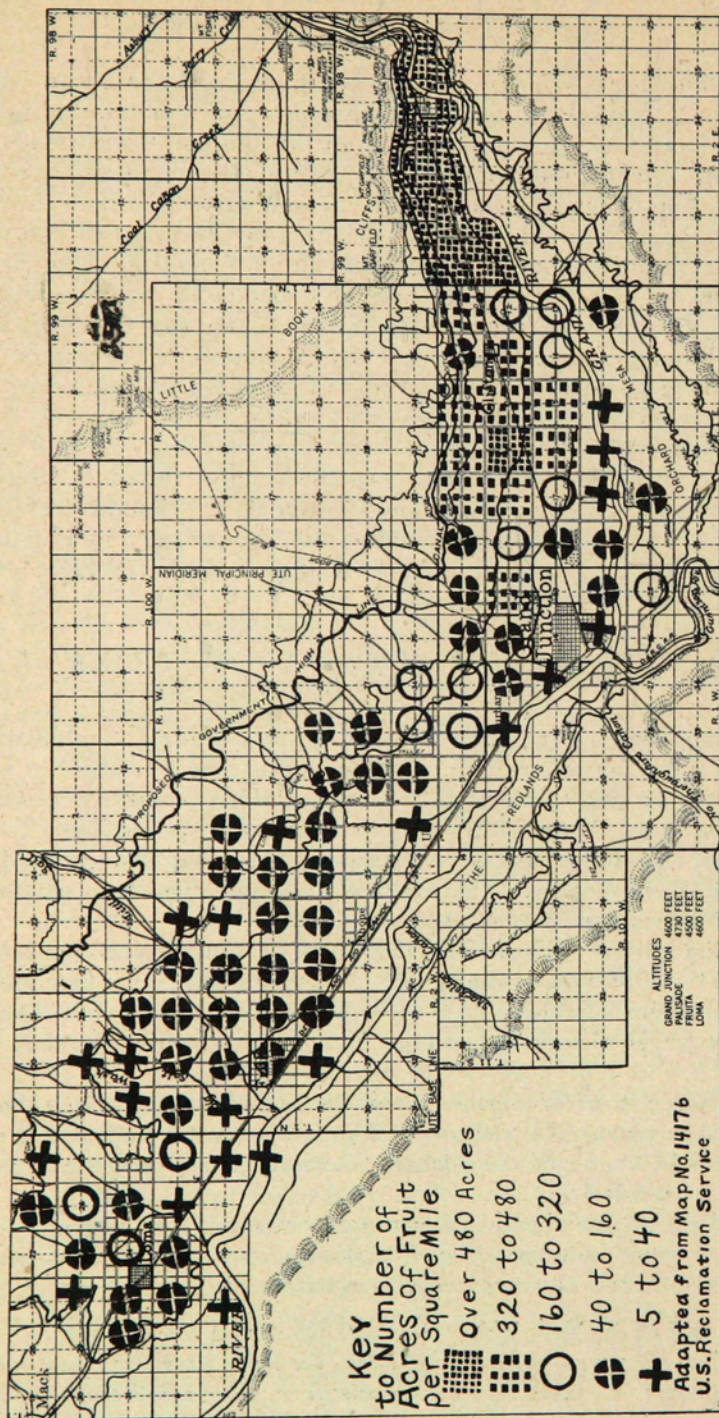
The entire Palisade District north of the river is marked as being three-fourths orchard. It is possible that some sections of this district have not such a high per cent of orchard, but there is even a larger percentage of fruit land in most sections of this district.

There are a few sections which are left blank, but which should have been marked on the map. This is due to the fact that it was impossible to locate the orchard as to sections when the orchard itself was listed.

West of the Palisade District there is only one section which is over three-fourths orchard, and only one section west of the Clifton District is over one-half orchard.

#### EXPLANATION OF TABLES AND DIAGRAMS

For clearness and compactness, we have presented much data in the form of tables. In some instances, diagrams have been con-



Map Showing Relative Density of Orchard in Each Square Mile Containing Over Five Acres of Fruit in Grand Valley.

constructed from the tables, showing graphically what the latter contain. These are very easily interpreted. Their method of construction is as follows: Suppose we want to show the number of fruit trees in each district of the Valley. Heavy perpendicular lines at regular intervals are chosen to represent the districts, these being arranged in order from left to right. Thus, the left line represents the Palisade District, the next one the Clifton District, etc. (See Diagram 1.) Next, horizontal lines are selected to represent the number of trees. The figures at the right of the sheet show the number represented. Referring, now, to Table I we find that the Palisade District contains 416,500 trees. (Total in right-hand column.) At a point on the left perpendicular equal to this number a mark is made. The same is done for the other districts, the mark on the second line being made at 578,625; the third at 217,350; the fourth at 150,575, and the fifth at 89,550. These points are then connected by a solid line which represents the total number of fruit trees in each district of the Valley. To represent the number of trees of each fruit the same method is used, the only difference being that different kinds of connecting lines are used, in order to be easily distinguishable from each other. A "key" is given on the diagrams to show what each line represents. In some cases, the lines are also lettered for greater facility of interpretation. By studying and comparing the tables and diagrams, much interesting information may be obtained. We have endeavored to present this information in the way easiest to comprehend.

#### CONTENTS OF TABLES AND DIAGRAMS

To prevent confusion, the diagrams are numbered the same as the tables from which they are constructed. There are, consequently, several numbers missing, as some tables have no diagrams corresponding to them.

Table I, Page 25.—This table shows the number of trees of the different fruits for each separate fruit district, and for the Valley as a whole; also the total number of fruit trees of all kinds for each district, and the total of all fruit trees in the Valley.

Table Ia.—An adaptation of Table I to show the percentage of all trees of each fruit contained in each district. The same is shown for the Valley as a unit. For example, we see that of the apple trees of the Valley, the Palisade District has 5.7%, the Clifton District, 47.2%, etc. Thus, it is clearly seen where any fruit is grown most extensively.

Table II, Page 26.—Shows the number of acres of orchards in each district in the Valley.



Table IIa.—Shows the estimated number of acres of bearing orchards in each district.

Table III.—This shows the number of cars of fruit shipped from Grand Valley for each year from 1911 to 1915, inclusive.

Tables IIIa, IIIb, IIIc, and IIId give the number of cars of apples, pears, peaches and mixed fruits shipped from each town in Grand Valley for the years 1911 to 1915, inclusive.

Table IV.—This shows the six most important commercial apples of Mesa County, with their percentage of all apples grown for each district, also for the Valley as a whole.

Diagram 4. Same as Table IV.

Tables V, VI, VII, VIII and IX.—These tables give the principal varieties respectively of pears, peaches, plums, apricots and cherries for each district, and for the Valley as a whole. In the case of apricots and cherries, many varieties were unknown, and consequently, the percentage of fruits listed as "all others" is, in these cases, quite large.

Tables X, XI and XII.—These tables show the number of trees of apples, pears and peaches, respectively, in each of the fruit districts, separated into the age classes as defined on Page .... From this we learn that the Clifton District has 196,000 apple trees from seven to ten years old, and only 46,000 over sixteen years old (Table X); that there are 20,300 pear trees in the Palisade District, and 47,750 in the Clifton District less than seven years old (Table XI); that the Palisade District contains 214,000 peach trees from seven to ten years old (Table XII).

Diagrams 10, 11 and 12.—Adapted from the above tables and show graphically what these tables contain.

Tables Xa, XIa and XIIa.—These tables are constructed from Tables X, XI and XII to show what part of all the trees of any age in the entire Valley are planted in each separate district. These are given in percentage form. Thus we see that 33.4% and 32.2% of the apple trees one to six years old are planted in the Clifton and Loma Districts, respectively, while only 6% are in the Palisade District, etc.

Tables Xb, XIb and XIIb.—By referring to these tables we may find what percent of the trees of any district are of any given age class. For example, from Table XIIb, it is found that 66.8% of all the peaches of the Valley were planted seven to ten years ago, when the fruit business was at its height.

Tables XIII, XIV and XV give the percentage of trees in each age class for plums, apricots and cherries and also show the total number of trees for each age class and for each district.

TABLE I.—SHOWING NUMBER OF FRUIT TREES IN EACH DISTRICT.

District	Apples	Pears	Peaches	Plums	Apricots	Cherries	District Totals
Palisade .....	42,750	44,500	320,000	1,750	2,200	5,300	416,500
Clifton .....	354,000	149,500	69,000	2,150	800	3,175	578,625
Grand Junction .....	134,750	67,000	10,500	1,600	350	3,150	217,350
Fruita .....	129,750	13,600	5,400	500	250	1,075	150,575
Loma .....	88,750	400	100	....	....	300	89,550
Valley Totals..	750,000	275,000	405,000	6,000	3,600	13,000	1,452,600

TABLE Ia.—DISTRIBUTION (IN PERCENTAGES) OF TOTAL NUMBER OF TREES OF EACH FRUIT IN GRAND VALLEY BY DISTRICTS.

District	Apples	Pears	Peaches	Plums	Apricots	Cherries	Entire Valley
Palisade .....	5.7	16.2	79.0	29.2	61.0	40.8	23.6
Clifton .....	47.2	54.3	17.1	35.8	22.3	24.4	39.8
Grand Junction...	18.0	24.3	2.6	26.7	9.7	24.2	15.0
Fruita .....	17.3	5.0	1.3	8.3	7.0	8.3	10.4
Loma .....	11.8	0.2	....	....	....	2.3	6.2
Total .....	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE Ib.—SHOWING RATIO IN PERCENT EACH FRUIT BEARS TO TOTAL NUMBER OF ALL FRUIT TREES FOR EACH DISTRICT.

District	Apples	Pears	Peaches	Plums	Apricots	Cherries	
Palisade .....	10.2	10.7	77.0	0.4	0.5	1.2	100.0
Clifton .....	61.2	25.9	11.8	0.4	0.1	0.6	100.0
Grand Junction...	62.2	30.9	4.8	0.7	...	1.4	100.0
Fruita .....	86.1	9.1	3.6	0.3	0.2	0.7	100.0
Loma .....	99.0	0.5	0.1	...	...	0.4	100.0
Entire Valley....	51.5	19.0	28.0	0.4	0.2	0.9	100.0

## INVENTORY OF FRUIT TREES

In making the survey, a careful record was kept regarding the number and varieties of all of the various fruits. These data, when compiled, gave the approximate number of each variety of fruit grown. The more important data are listed in tables, and by referring to them one may learn very nearly the position which these varieties hold in Grand Valley and each of the districts thereof.

As is shown in Tables I and II, there are 10,250 acres of apples comprising 750,000 trees; 2,400 acres of pears, or 275,000 trees; 3,000 acres of peaches, 405,000 trees; 190 acres of plums, apricots and cherries, comprising together, 22,600 trees. This gives a total for all fruits of 15,840 acres, or 1,452,600 trees. From this it may be seen that of the total number of fruit trees, 51.5 are apples, 19% pears, 28% peaches, 4% plums, 2% apricots, and 9% cherries. Approximately 75% of the apples, 70% of the pears, 90% of the peaches, and 90% of the plums, apricots and cherries are in bearing. Of all the trees listed in the Palisade District, 77% are peaches, 10.7% pears, 10.2% apples, and 2.1% other fruits (plums, apricots and cherries).

The Clifton District has 61.2% apples, 25.9% pears, 11.8% peaches, and 1.1% other fruits.

TABLE II.—NUMBER OF ACRES OF ORCHARD FOR EACH DISTRICT IN GRAND VALLEY.

	Palisade	Clifton	Grand Jct.	Fruita	Loma	Valley Totals
Apples .....	520	4,515	2,010	1,855	1,350	10,250
Pears .....	350	1,260	650	136	4	2,400
Peaches .....	2,375	500	80	44	1	3,000
Plums, Cherries and Apricots...	78	52	42	15	3	190
Totals, All Fruits.....	3,323	6,327	2,782	2,050	1,358	15,840

TABLE IIa.—NUMBER OF ACRES ORCHARD OF BEARING AGE FOR EACH DISTRICT.

	Palisade	Clifton	Grand Jct.	Fruita	Loma	Valley Totals
Apples .....	388	3,750	1,572	1,530	450	7,690
Pears .....	190	857	481	125	1—	1,654
Peaches .....	2,175	463	62	43	1—	2,744
Plums, Cherries and Apricots	66	47	47	10	3—	173
Totals, All Fruits.....	2,819	5,117	2,162	1,708	455	12,264

Grand Junction has 62.2% apples, 30.9% pears, 4.8% peaches, and 2.1% other fruits.

Fruita District has 86.1% apples, 9.1% pears, 3.6% peaches, and 1.2% other fruits.

In the Loma District, 99% of all the fruit trees are apples, .5% pears, .1% peaches, and .4% other fruits.

From Table Ia, it is seen that 79% of all the peaches grown in the Valley are in the Palisade District, 54.3% of the pear trees, and 47.2% of the apple trees are in the Clifton District. The table also shows the Clifton District to contain 39.8% and the Palisade District 28.6% of all the fruit trees in the Valley.

TABLE III.—NUMBER CARS OF FRUIT SHIPPED BY FREIGHT FROM GRAND VALLEY FOR YEARS 1911 TO 1915 INCLUSIVE.

	1911	1912	1913	1914	1915	5-Year Total
Apples .....	1,253	1,627	813	2,622	145	6,460
Pears .....	212	314	228	519	55	1,328
Peaches .....	149	1,336	856	1,302	744	4,387
Mixed Fruits .....	36	86	89	121	46	378
Valley Totals, All Fruits.....	1,650	3,363	1,986	4,564	990	12,553

## NUMBER CARS OF FRUIT SHIPPED FROM GRAND VALLEY FOR YEARS 1911 TO 1915 INCLUSIVE AND NUMBER FROM EACH SHIPPING POINT.

TABLE IIIa.—APPLES.

	1911	1912	1913	1914	1915	5-Year Total
Palisade .....	138	73	117	117	51	496
Clifton .....	258	405	226	861	30	1,780
Grand Junction .....	645	760	412	1,307	64	3,188
Fruita .....	212	389	58	336	...	995
Loma .....	...	...	...	1	...	1
Valley Totals, by Years.....	1,253	1,627	813	2,622	145	6,460

TABLE IIIb.—PEARS.

	1911	1912	1913	1914	1915	5-Year Total
Palisade .....	19	22	36	36	24	137
Clifton .....	56	97	74	193	6	431
Grand Junction .....	137	193	118	285	25	758
Fruita .....	...	2	...	...	...	2
Valley Totals, by Years.....	212	314	228	519	55	1,328

TABLE IIIc.—PEACHES.

	1911	1912	1913	1914	1915	5-Year Total
Palisade .....	138	989	851	1,091	733	3,802
Clifton .....	10	215	3	168	...	396
Grand Junction .....	1	131	2	43	11	188
Fruita .....	...	1	...	...	...	...
Valley Totals, by Years.....	149	1,336	856	1,302	744	4,387

TABLE IIId.—MIXED FRUITS.

	1911	1912	1913	1914	1915	5-Year Total
Palisade .....	17	25	81	58	45	226
Clifton .....	...	25	2	34	...	61
Grand Junction .....	19	36	6	29	1	91
Valley Totals, by Years.....	36	86	89	121	46	378
Valley Totals by Yrs., All Fruits	1,650	3,363	1,986	4,564	990	12,553

## APPLES

The apple has been grown commercially in Grand Valley for only about 25 years, although much of the Valley is especially adapted to its culture. It was here that Colorado apples first came into prominence, and this section of the country was one of the first to adopt the box pack for apples. The fruit developed wonderfully and so far surpassed eastern fruit that the sale for it was practically unlimited. The prices obtained were very good, and the pioneer apple growers reaped rich returns for a few years.

Soon there was a mad rush into the business. All kinds of trees were planted under all kinds of conditions. Nurserymen sold badly mixed up lots of trees, and the result was that over 150 varieties were grown in the Valley. There are still over 100 varie-

ties grown, but only ten varieties which include over 1% each of the apples. They are, in order of importance, Jonathan, Winesap, Gano, Ben Davis, Missouri Pippin, Rome Beauty, Arkansas (Mammoth Blacktwig), White Winter Pearmain, York Imperial, and Delicious. The first six of these comprise 85.7% of the total trees planted. Table IV and Diagram 4 show the percentage of each of these varieties in each district and in the Valley as a whole. Note that there are three varieties which have a larger percentage than the miscellaneous varieties (over 100 in all), which are listed as "All Others."

The Jonathan is by far the most important apple grown. Over one-fourth of all the annual output is of this variety. The Jonathan is a fall variety, ripening in September, and is a splendid dessert apple. It thrives well under a variety of conditions, and is usually an annual bearer. The demand for this apple is always good.

The Winesap is second in rank. It is a greenish-red winter apple with a spicy flavor and is a general favorite with most persons. It seldom attains good size, but bears very heavily.

Gano is rapidly replacing Ben Davis, of which it is a seedling. It resembles the Ben Davis very much in appearance but is solid red, instead of being striped. It has a somewhat better flavor than the Ben Davis, and, like this apple, is a splendid keeper, often holding up well until the early summer apples come on. It is rather inferior in quality, but is very much in demand in southern



A Perfect Apple Orchard Twenty-five Years Old in Grand Valley.



and Mississippi Valley markets. Gano will grow on almost any apple soils, but attains better color on the well-drained loams. Grand Valley grows this apple to perfection.

Ben Davis was originally grown more than any other variety in Grand Valley. There are still a great many bearing trees, but they are mostly old ones. In the Grand Junction and Fruita Districts there are a great many acres of Ben Davis trees. In the younger plantings, however, it is usually supplanted by Gano. Ben Davis is poor in quality and its chief virtue lies in its hardiness, growth habit, productiveness and keeping qualities.

Missouri Pippin is used very extensively for fillers. It is a small, slow-growing tree, very prolific and a regular bearer. It is grown most extensively in the Clifton District. The fruit itself is usually small, of a greenish-red or often dark-red color, with prominent white dots. The quality is rather poor, but the apple is well adapted for storage purposes.

Rome Beauty ranks sixth in order of percentage. It is one of Colorado's best apples. The fruit is usually of good size, yellowish-red or light red in color, with fairly conspicuous dots. The quality is good, but the texture of flesh is somewhat coarse. The apple is a good shipper and keeps well. It has a ready sale in the better markets.

The following varieties are sufficiently numerous to comprise between .1% and 1% of trees planted, named in order of importance: Stayman, Black Ben, Grimes, Minkler, Spitzenburg, Arkansas Black, McIntosh, King David, Winter Banana, Shackelford, Geniton, Wealthy, Champion, Lawver, Senator, Yellow Transparent, and Willow Twig.

The best early varieties for the Valley are Yellow Transparent and Wealthy. Yellow Transparent ripens late in July, and the Wealthy in the early part of September. These are both splendid apples, but are not much grown commercially, as the market for early apples is limited.

TABLE IV.—SIX PRINCIPAL VARIETIES OF APPLES, SHOWING PERCENTAGES GROWN IN EACH DISTRICT AND IN ENTIRE VALLEY.

Variety	Palisade	Clifton	Grand Jct.	Fruita	Loma	Entire Valley
Jonathan .....	31.0	27.0	24.0	27.0	23.4	26.5
Winesap .....	15.7	21.0	16.2	12.2	22.6	18.7
Gano .....	8.1	16.8	17.6	22.3	17.4	17.5
Ben Davis .....	11.6	9.5	12.6	14.8	0.9	10.1
Missouri Pippin .....	7.5	9.5	4.5	5.0	8.9	7.6
Rome Beauty .....	4.9	4.2	5.0	2.2	15.1	5.3
All Others (over 100 varieties) .....	21.2	12.0	20.1	16.5	11.7	14.3
Totals .....	100.0	100.0	100.0	100.0	100.0	100.0

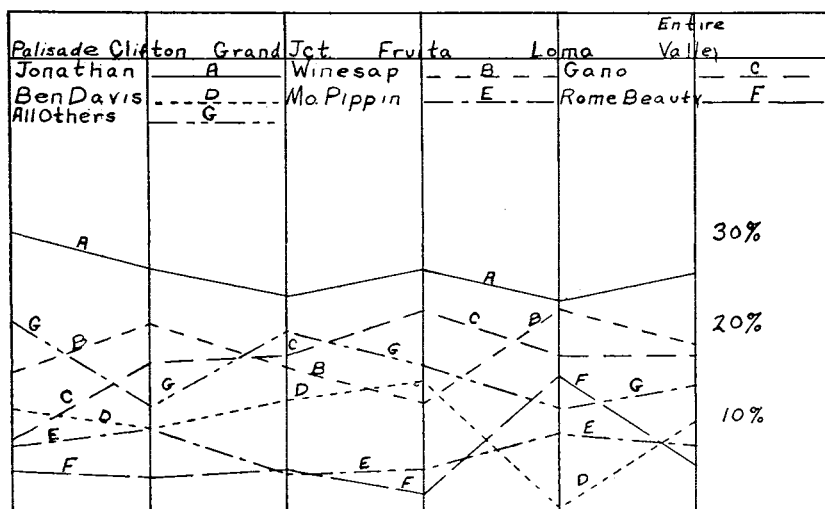


Diagram 4.—Percentage of Principal Varieties of Apples for Each District and for Valley as a Whole (Adapted from Table IV).

### CULTURAL METHODS

As a general thing, apple orchards are cover cropped. Alfalfa and clover are mostly used for this purpose. Where properly treated, this is undoubtedly beneficial to the trees, since it adds fertility and humus to the soil and keeps the soil in better condition than when cultivated. Clover is the more desirable of the two, since it is easier to eradicate.

Many growers in 1915 took a fair yield of hay from their orchard cover crops. Ordinarily, this practice is to be condemned, but in most cases since there was no fruit crop, it did not injure the trees noticeably.

### PRUNING

In order to produce apples of good size and color, regular pruning is essential. This must be done systematically and intelligently, but fearlessly. The object should be to thin out surplus wood growth, keeping the trees open to light and air, and to induce a low-spreading form of tree rather than a high and narrow one. A considerable amount of thinning may be eliminated by proper pruning.

Few orchardists have paid enough attention to pruning. The failure has been not to prune regularly or properly, and often both are wanting. Many trees are headed and pruned high, so that a very long ladder is necessary for picking. Most of the younger orchards, however, are better pruned.

## THINNING

In ordinary years thinning is absolutely essential to the growing of fruit of marketable size. One must be heartless in order to do good work at thinning, as it is often necessary to remove over half of the apples. It is a paying proposition in the end, as more first-grade fruit is produced than if no thinning had been done.

One can best learn to thin fruit by watching somebody who is expert at this work. By looking at a tree properly thinned and trying to follow this as a model, one soon learns just how much fruit to leave on the tree.

## DISTANCE OF PLANTING

The writers were amazed to find apple trees planted so thickly in the Grand Valley orchards. In the majority of cases the trees were set 20 feet or less apart. Common distances of planting were 16x20 feet and 18x20 feet, and several orchards were even set 15x15. One case is recalled of an orchard about 20 years old set 15x15 in which the trees were so interlaced that sunlight seldom touches the ground. There are several such orchards in the Valley.

Permanent apple trees should not be closer than 25 feet each way, and 30 feet is better, depending of course, upon the variety. When set at this distance, fillers may be used, but they should be removed as soon as they interfere with the permanent trees. The latter will occupy very nearly all of the space when they attain their full growth.

One of the best young orchards in the Valley is that of Warren Walker, one-half mile north and one-fourth mile east of Fruitvale Switch. It is a ten-year-old orchard of Jonathan, Gano and Winesap apples set 25x30 feet, and shows what can be obtained with proper setting and good care.

## FILLERS

A filler is a temporary tree placed between the permanent ones to be removed before it interferes with them. The trees selected for fillers are usually short-lived and come into bearing early. The majority of the orchards in Grand Valley have been planted with fillers, mostly of the pomaceous fruits though stone fruits are sometimes used for this purpose.

The use of fillers is to be recommended where there is ample room between permanent trees, and where the fillers are taken out in time. Too often the fillers are left long enough to spoil the shape of the permanent trees. This practice is the rule rather than the exception and should be condemned.

Missouri Pippin is the apple most used for fillers, and is admirably adapted to this purpose. It is a small tree, short-lived, and an early and heavy bearer. Grimes Golden, too, is well suited for use as a filler. Pears are also often used and serve the purpose very well. Bartlett and Keiffer are the best for Grand Valley. Peaches and cherries are sometimes planted as fillers, but so little of the apple territory is adapted to their growth that they are almost excluded as fillers among the apples.

### SPRAYING

Spraying is absolutely imperative for the production of good apples. The codling moth is so bad in Grand Valley that many growers spray eight to ten times a season, thinking thereby to get clean fruit. As a matter of fact, their fruit is no less wormy than it would have been with four or five sprays applied at the right time. It is the concensus of opinion of the Grand Valley orchardists that with less than four sprays it is impossible to grow clean fruit. However, it has often been proven that fully as much depends upon the time and thoroughness of spraying as upon the number of applications.

The amount of arsenate of lead paste used per 200-gallon tank varies from 5 to 16 lbs., with an average for the Valley of 9 lbs. This is somewhat more than necessary. Eight pounds is enough when kept well agitated in the tank. The powder form of arsenate of lead is used by many in preference to paste. Only half as many pounds of poison is necessary when the powdered form is used.

Pears are sprayed the same as apples except that the calyx spray is omitted, since the calyxes do not close.

The average percent of the clean fruit for the Valley, according to the growers' estimates, is 77½% for apples and 87½% for pears. The estimates vary from 50% to 98%.

The spraying of peaches for twig borer varies from nothing to two applications of spray per year. Few growers, however, can be accused of spraying peaches twice a year. The best practice is to give a dormant spray of lime-sulphur every year just before the buds begin to open. The trees which are regularly sprayed with this solution are more healthy and the fruit is cleaner than when the trees are not sprayed. Some growers prefer arsenate of lead applied shortly after the buds have opened, but general usage favors lime-sulphur.

The spraying should be done according to directions of the State Entomologist, who will gladly furnish instructions for this work.

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Probably less than half of the fruit growers own spraying machines. This means that they must hire a machine to do their spraying. This is usually more expensive and less satisfactory than having a machine of one's own, because the rented sprayers can not always be had at the most effective time for spraying.

The usual charge for a man, team and sprayer is \$1.00 for each tank (200 gallons) of arsenical spray applied and \$1.25 per tank for lime-sulphur.

### PEARS

From a financial standpoint, the pear seems to be the best fruit for Grand Valley to grow. Most pears are grown here to perfection, and the supply is seldom greater than the demand on any good market.

Pears thrive on a heavier soil and succeed where the stone fruits fail. They also stand more neglect than the other tree fruits. Their chief drawback is the danger from pear blight.

### PEAR BLIGHT

Pear blight, also known as fire blight, spur blight, blossom blight and body blight, is a bacterial disease which has caused the loss of thousands of good pear trees in Grand Valley. The disease was very prevalent in 1915. While it was found all over the Valley, it was worse in a few localities, as for example, just east of Grand Junction, about six miles northwest of Grand Junction, on Orchard Mesa southeast of Grand Junction, and a few localities at Palisade, where the attacks were less severe.

Blight is usually associated with succulent wood growth caused by too much irrigation. It also gives evidence of being related more or less directly to injury by late spring frosts. As blight was found on some orchards which had not been watered and which had made very little wood growth the preceding year, it seemed very plausible that the blight was materially aided by frost. There is no known cure for the disease. The best method of control is to cut-out the branches as soon as the blight is discovered. The cut should be made 10 inches or more below the point where the blight occurs. The limb should never be cut off and left as a stub, but should be removed to the nearest lateral branch.

As a precaution against spreading the disease, the tools should be disinfected by dipping into a 1-1000 solution of corrosive sublimate. Nearly all of the blight in Grand Valley in 1915 gave evidence of starting in the blossoms. Some of it did little damage except to the fruit spurs. In many orchards, however, where fruit



spurs were located on scaffold branches, the disease spread so that the entire limb had to be removed.

Many cures for blight have been advertised and some of them have been tried out by Grand Valley fruit growers. They usually consist of a paint which is applied to the trees, the supposition being that some poisonous substance in the paint will penetrate the bark and be carried in the circulation of the sap and thus kill the bacteria which cause the disease. This belief is erroneous, however, as it is not in the least effective in curing the disease. The authors saw some of these paints tried, and trees which had been painted with it blighted as badly as those to which it had not been applied. The best and surest method of preventing blight is to keep the trees in a slow growing condition by refraining from too frequent irrigation or over-cultivation.

There is a great varietal difference in resistance to blight. Keiffer withstands the disease exceptionally well. Anjou, Garber and Lawrence are fairly resistant while Bartlett and P. Barry are very susceptible to blight.

Pears are grown most extensively in the three eastern districts of the Valley. Clifton takes first place in the production of pears, having 54.3% of the trees in the Valley. Grand Junction is second with 24.3%, and Palisade, third, with 16.2%.

At Palisade nearly half, and at Loma over nine-tenths of the pears have never borne fruit, but two-thirds of the pear trees of the Clifton District, three-fourths of those in the Grand Junction District, and nine-tenths of the pears in the Fruita District are of bearing age.

In the Palisade District, a good many pears are being planted, often replacing peaches. The Loma District has but few pears, and almost all of the trees are young. Practically no pear trees are being planted in the Fruita District, and very few in the Grand Junction District. There are some pear orchards in these two districts whose development it will be interesting to watch. Chief of these are the Wallace orchard about one mile south of Hollandville, the Copeco orchard two miles east of the Hunter school-house, and the Chula Vista orchard one and one-half miles north of the Copeco ranch. These are all large orchards and are planted to good varieties.

#### VARIETIES

Bartlett is the most popular pear grown in Mesa County. Almost one-half of the trees are of this variety. The Bartlett trees in the Clifton District alone constitute one-fourth of all the pears

in the Valley. This pear ripens in August. It is of good quality and sells well. The tree bears regularly, but is very susceptible to blight.

TABLE V.—THREE PRINCIPAL VARIETIES OF PEARS, SHOWING PERCENTAGE GROWN IN EACH DISTRICT AND IN ENTIRE VALLEY.

Variety	Palisade	Clifton	Grand Jct.	Fruita	Loma	Entire Valley
Bartlett .....	56.6	46.5	44.5	25.5	7.8	47.5
Keiffer .....	26.8	33.8	32.2	28.4	52.2	31.8
Anjou .....	5.3	8.6	12.7	23.2	9.6	9.8
All others (over 40 varieties) .....	11.3	11.1	10.6	22.9	30.4	10.9
Totals .....	100.0	100.0	100.0	100.0	100.0	100.0

Keiffer ranks second in importance. It is a late fall pear, rather poor in quality, and much used for canning. It is an excellent shipper and a good keeper. The tree is very vigorous, an upright grower, and quite resistant to blight. Due to the prevalence of blight in Grand Valley, it is very well adapted for planting.

Anjou comprises nearly 10% of the Grand Valley pear trees. It is a wonderful pear and brings top prices on the market. The fruit ripens late in the fall and keeps well. The quality is excellent. Anjou is fairly resistant to blight, and should be more commonly planted. Its chief faults are, coming into bearing late and not bearing a full crop every year. These failings may be somewhat corrected by judicious pruning.

There are five other varieties, each of which includes 1% or more of the total pears of the Valley. They are: Winter Nelis, 1.8%; Flemish Beauty, 1.7%; Garber, 1.3%; Lawrence, 1.3%; P. Barry, 1%.

About 50 varieties are grown, but those mentioned are the most important. There will probably be many pear trees planted in Grand Valley in the future, and this list should serve as a guide in choosing varieties.

#### CULTURAL METHODS

Clean cultivation and cover cropping are about equally divided among pears. Cover crops are used more in the western part of the pear belt, while in the eastern part, clean culture is the rule. There is perhaps less tendency to blight when a cover crop is grown. The trees seem to do better when this practice is followed, although they are usually slower growing than when under clean culture. Too frequent irrigations accompanying continued clean cultivation have been the ruin of many good pear orchards.

#### PRUNING

Pears require considerably less pruning than apples. A common belief is that they should not be pruned any more than is ab-

solutely necessary. This is wrong, however, as experience has shown that many bad habits may be rectified by proper pruning. Smallness of fruit and irregularity of bearing are among the ills which may be largely corrected in this manner. The pruning of pears has been too much under-estimated and neglected by Mesa County growers.

### THINNING

It is essential that in the normal crop year pears should be thinned in order to get proper size. Thinning also tends to promote annual bearing instead of biennial crops as often occur when pears are allowed to mature too heavy crops. If the pear growers would thin heavier, the demand for Colorado pears and the net return from them would increase.

### DISTANCE OF PLANTING

Like apple trees, pears are often set much too closely. While they should be allowed 18 or 20 feet, they are often set 15 feet apart, and sometimes as close as 12 feet, in which case the orchards develop into veritable thickets. It is farcical to believe that the profits increase with the number of trees per acre. It will be a glorious day for horticulture when orchardists give their trees plenty of room to develop.

### PEACHES

"Palisade Peaches" is a term that has been as popular as "Rocky Ford Melons." There was, indeed, good reason for this, since the Palisade products were superior to nearly all others on the market. The Palisade District is especially adapted to peach growing. Most of the soil is of a sandy loam character, naturally well drained, and easily worked.

The orchards on the north extend clear to the foot of the cliffs, which rise abruptly to a height of several hundred feet above the Valley. These bluffs absorb the heat of the sun and radiate the heat so strongly that peaches grown next to them are from one to several days earlier than those grown lower down. These bluffs are also a great protection against frost. Some growers report that the blush on peaches grown close to the bluffs is often on the side nearest the cliffs, due to the additional heat.

### VARIETIES

The Elberta has been the leading variety in Palisade, as in nearly all commercial peach sections. Although there are over 50 varieties grown in Grand Valley, five-sixths of the trees are El-

bertas. This variety is a freestone, attractive in appearance, a good shipper, and splendid for canning, although rather poor in quality.

Carman ranks second in number of trees, with 3.8% for the Valley as a whole. It is a freestone, creamy white, with a delicious flavor, flesh sometimes streaked with red near the seed, an excellent peach.

Only four other varieties, comprising more than 1% each of the peaches of the Valley, are grown. These are: Salway, 1½%; Crawford, 1.3%; Triumph, 1.1%, and Champion, 1.1%. All other varieties combined constitute 7.3%.

The early peaches are not commercially profitable. They do not stand up well under shipment and the market for them is very limited. Their use must be confined largely to planting for local market.

#### CULTURAL METHODS

As a general thing, peaches are clean cultivated. Many orchards have been thus handled for so long that practically all the organic matter is burnt out of the soil. The soil in these cases bakes easily and is hard to handle.

Practically all of the peach orchards in which clover or alfalfa was grown and properly handled appeared to be in much better condition than those which had been continually clean cultivated. Some growers, of course, use the cover crop as hay, but where this is done the trees suffer from the treatment. The cover crop is intended to provide organic matter for the land and reduce evaporation of soil moisture. It is ridiculous to suppose that the cover crop can be removed from the land without injury to the trees, for the land cannot support two crops successfully where nothing is returned to it.

Some of the best peach growers in the Valley practice clean cultivation, but supply large amounts of stable manure every year. This supplies the organic matter which is so essential for successful fruit growing. The chief drawback in this practice is the scarcity of manure available. Cover cropping will be best for the majority of orchardists.

#### PRUNING

The peach is a tree that requires very heavy pruning. Unless severely pruned, insufficient new wood is formed to provide for the next year's crop. Whenever neglected, the fruit will be small and unprofitable. Good growers always pay close attention to their pruning.

## THINNING

Thinning is another item that is of extreme importance. The majority of growers do not thin enough, and as a result their fruit is too small to be of first-grade. There is very little danger of thinning too much.

## DISTANCE OF PLANTING

There has been a tendency in the past to plant peaches too close together. Numerous orchards have the trees 15x15 feet, and some even less. This is entirely too close. For proper development they should be at least 18, and preferably 20 feet apart.

TABLE VI.—PRINCIPAL VARIETIES OF PEACHES WITH PERCENTAGE GROWN IN EACH DISTRICT AND IN ENTIRE VALLEY.

Variety	Palisade	Clifton	Grand Jct.	Fruita	Entire Valley
Elberta .....	83.0	88.0	80.5	73.5	83.9
Carman .....	3.6	4.6	4.4	6.6	3.8
Salway .....	1.7	0.7	1.5	...	1.5
Crawford .....	1.3	0.8	0.7	...	1.3
Triumph .....	1.1	0.7	1.1	...	1.1
Champion .....	1.0	1.0	2.1	...	1.1
All others (about 50 varieties).....	8.3	4.2	9.8	19.9	7.3
Totals .....	100.0	100.0	100.0	100.0	100.0

## PLUMS

Plums are not grown very extensively in Mesa County, totaling only about 6,000 trees, and are grown mostly in the eastern part of the Valley. They are not profitable commercially as a rule, although some varieties yield very fair returns.

Satsuma is the leading variety, numbering almost one-fifth of all the plum trees. It is a good-sized plum with a dark-red skin and firm meat. It is one of the Japanese plums, an upright grower and a fair bearer.

The Italian prune comprises 18.2% of the plums. In size it is medium to large, with dark-blue skin, firm greenish-yellow flesh and good quality. It is a general favorite among the prunes.

The other important varieties, with percentage of each grown, are: Burbank, 9.4%; Agen (French prune), 7.2%; Wild Goose, 6.5%; Hungarian prune, 4.6%; Red June, 4%; Golden Drop (Silver prune), 3.2%; Damson, 3%; Green Gage, 2.5%; Bradshaw, 2.1%; Abundance, 1.8%; Peach, 1.8%.

## CULTURE OF PLUMS

Plums are pruned less heavily than peaches, but are thinned much the same. It is almost impossible to prune the native plums satisfactorily, as they are such bushy growers. European and Japanese plums are adapted to almost the same conditions as the peach.

Prunes are also considered under plums in this discussion.



The native varieties are hardier and succeed under less favorable conditions. Plums should be set 18 to 20 feet apart and given about the same cultural treatment as peaches.

TABLE VII.—PRINCIPAL VARIETIES OF PLUMS AND PRUNES, WITH PERCENTAGE GROWN IN EACH DISTRICT AND IN ENTIRE VALLEY.

Variety	Palisade	Clifton	Grand Jct.	Fruita	Entire Valley
1. Satsuma .....	29.3	17.2	19.0	2.9	19.5
2. Italian Prune .....	12.8	26.5	15.0	12.4	18.2
3. Burbank .....	10.5	9.4	6.7	15.0	9.4
4. Agen (French Prune) .....	....	3.9	9.4	4.5	7.2
5. Wild Goose .....	3.0	2.5	8.1	30.5	6.5
6. Hungarian Prune .....	9.5	4.5	1.7	....	4.6
7. Red June .....	5.8	2.2	5.8	....	4.0
8. All others (15 varieties) .....	29.1	33.8	34.3	34.7	30.6
Totals .....	100.0	100.0	100.0	100.0	100.0

TABLE VIII.—PRINCIPAL VARIETIES OF APRICOTS, WITH PERCENTAGE FOR EACH DISTRICT AND FOR ENTIRE VALLEY.

Variety	Palisade	Clifton	Grand Jct.	Fruita	Entire Valley
Montgamet .....	38.0	3.6	1.4	...	24.8
Moorpark .....	18.0	19.0	19.0	41.5	19.8
Newcastle .....	13.5	0.7	8.7	...	8.7
Royal .....	7.3	...	...	...	4.7
Miscellaneous and unknown .....	23.2	76.7	70.9	58.5	42.0
Totals .....	100.0	100.0	100.0	100.0	100.0

## APRICOTS

Only about 3,600 apricot trees are grown in Mesa County, and nearly two-thirds of them are in the Palisade District. They are not very popular with the fruit growers, although it is difficult to understand why they are not grown more extensively.

Apricots thrive under about the same conditions as are required by the peach, although they are somewhat more discriminating. They need about the same care as the peach. Apricots are not very well known by the growers, as to variety, consequently, nearly one-third of the apricots were listed as unknown varieties. Of those known varieties the leading ones were Montgamet, 24.8%; Moorpark, 19.8%; Newcastle, 8.7%; Royal, 4.7%. The miscellaneous and unknown varieties constitute the remaining 42%.

## CHERRIES

Grand Valley has about 30 varieties of cherries, comprising approximately 1,300 trees. Palisade leads in the number of trees, followed by Clifton and Grand Junction.

Comparatively few cherries are grown in the western part of the Valley, the conditions here being too severe for their proper development. Many varieties of cherries are grown the names of

which are unknown to growers, 10% of the trees listed being classed as unknown.

#### VARIETIES

Royal Duke, 41%, a semi-acid cherry, is the leading variety. It is an upright grower, bearing large, dark-red fruit which has red, tender flesh of excellent quality. It is the favorite cherry and a good seller.

Early Richmond, 18%; Montmorency, 11%; English Morello, 4.9%. These three are sour cherries and are the hardiest varieties grown in the Valley. For canning they are excellent.

Napoleon (Royal Anne), 4.9%, and "Sixteen-to-One," 4.7%, are both sweet cherries and complete the six largely grown varieties.

Other less important varieties are: Mayduke, 2%; Republican, 1.3%; Olivet, 1%, and Bing, 1%.

#### CULTURE OF CHERRIES

Cherries need 16 to 20 feet distance in the orchard, according to varieties. They demand a fairly dry soil and should be cultivated much the same as the peach and apricot. Little pruning is necessary, although moderate pruning increases the size of the fruit and induces more regular bearing. Sour cherries are tolerably hardy and will endure more rigorous conditions than the sweet varieties. The latter succeed only under favorable conditions.

Cherries have not been very successful commercially in Grand Valley, and will probably be grown only to a limited extent for outside markets.

TABLE IX.—PRINCIPAL VARIETIES OF CHERRIES, WITH PERCENTAGE GROWN IN EACH DISTRICT AND IN ENTIRE VALLEY.

Variety	Palisade	Clifton	Grand Jct.	Fruita	Loma	Entire Valley
Royal Duke .....	51.2	40.3	37.8	3.7	3.8	41.0
Early Richmond .....	13.5	22.2	16.6	32.2	...	18.0
Montmorency .....	4.7	10.5	17.6	7.7	30.4	11.0
English Morello .....	3.8	2.8	7.8	4.3	16.6	4.9
Napoleon .....	6.5	5.7	2.7	1.0	...	4.9
16 to 1 .....	2.4	7.6	4.6	1.9	22.6	4.7
All others (20 varieties) ..	17.9	10.9	12.9	49.2	26.6	15.5
Totals .....	100.0	100.0	100.0	100.0	100.0	100.0

TABLE X.—NUMBER OF APPLE TREES OF EACH DISTRICT BY AGE CLASS.

Age Class	Palisade	Clifton	Grand Jct.	Fruita	Loma	Totals
1- 6 Years .....	11,000	61,000	29,500	22,500	59,000	183,000
7-10 Years .....	14,000	196,000	60,000	51,500	26,500	348,000
11-15 Years .....	11,000	51,000	13,250	18,750	1,500	95,500
16 and above .....	6,750	46,000	32,000	37,000	1,750	123,500
Totals .....	42,750	354,000	134,750	129,750	88,750	750,000

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TABLE Xa.—PERCENTAGE OF APPLE TREES OF EACH AGE CLASS PLANTED IN EACH DISTRICT.

Age Class	Palisade	Clifton	Grand Jct.	Fruita	Loma	Totals
1- 6 Years .....	6.0	33.4	16.1	12.3	32.2	100.0
7-10 Years .....	4.0	56.4	17.2	14.8	7.6	100.0
11-15 Years .....	11.5	53.5	13.8	19.6	1.6	100.0
16 and above.....	5.5	37.2	25.9	30.0	1.4	100.0

TABLE Xb.—PER CENT OF APPLE TREES OF EACH DISTRICT WITH RESPECT TO AGE.

Age Class	Palisade	Clifton	Grand Jct.	Fruita	Loma	Totals
1- 6 Years .....	25.7	17.0	21.8	17.5	66.4	24.4
7-10 Years .....	32.8	55.5	44.4	39.6	30.0	46.4
11-15 Years .....	25.8	14.5	9.8	14.3	1.6	12.7
16 and above.....	15.7	13.0	24.0	28.6	2.0	16.5
Totals .....	100.0	100.0	100.0	100.0	100.0	100.0

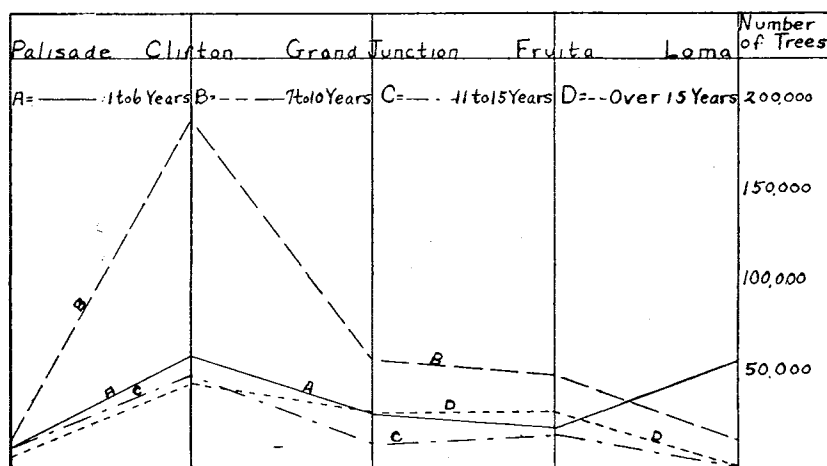


Diagram 10.—Number of Apple Trees in each Age Class for each District (Adapted from Table X).

TABLE XI.—NUMBER OF PEAR TREES OF EACH DISTRICT AND OF ENTIRE VALLEY BY AGE CLASS.

Age Class	Palisade	Clifton	Grand Jct.	Fruita	Loma	Entire Valley
1- 6 Years .....	20,300	47,750	17,400	1,100	365	86,915
7-10 Years .....	9,900	62,000	30,200	11,000	10	113,110
11-15 Years .....	7,700	22,500	8,500	600	.....	39,300
16 and over.....	6,600	17,250	10,900	900	25	35,675
Totals .....	44,500	149,500	67,000	13,600	400	275,000



TABLE XIa.—PERCENTAGE OF PEAR TREES OF EACH AGE CLASS FOR EACH DISTRICT.

Age Class	Palisade	Clifton	Grand Jct.	Fruita	Loma	Entire Valley
1- 6 Years .....	23.2	55.0	20.0	1.4	0.4	100.0
7-10 Years .....	8.7	54.9	26.8	9.6	...	100.0
11-15 Years .....	19.6	57.2	21.7	1.5	...	100.0
16 and over.....	18.5	48.0	30.3	2.5	0.7	100.0

TABLE XIb.—PERCENTAGE OF PEAR TREES OF EACH DISTRICT WITH RESPECT TO AGE CLASS.

Age Class	Palisade	Clifton	Grand Jct.	Fruita	Loma	Entire Valley
1- 6 Years .....	45.6	32.0	26.0	8.0	91.2	31.7
7-10 Years .....	22.2	41.4	45.2	81.0	2.5	41.0
11-15 Years .....	17.3	15.0	12.6	4.4	...	14.3
16 and over.....	14.9	11.6	16.2	6.6	6.3	13.0
Totals .....	100.0	100.0	100.0	100.0	100.0	100.0

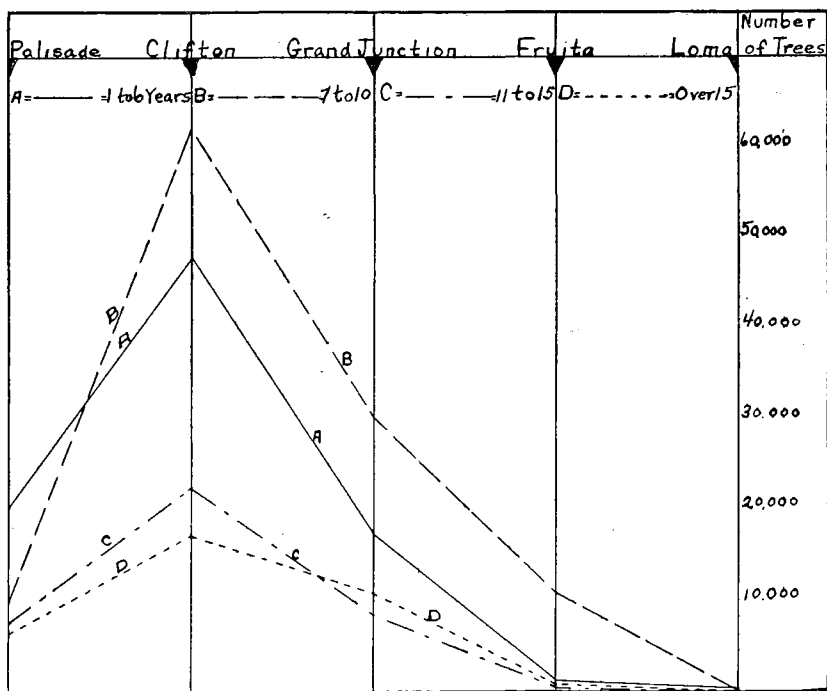
Diagram 11.—Number of Pear Trees in each Age Class for each District  
(Adapted from Table XI).

TABLE XII.—NUMBER OF PEACH TREES OF EACH DISTRICT AND OF ENTIRE VALLEY BY AGE CLASS.

Age Class	Palisade	Clifton	Grand Jct.	Fruita	Loma	Entire Valley
1- 6 Years .....	27,000	5,000	2,400	80	20	34,500
7-10 Years .....	214,000	51,000	5,400	10	65	270,475
11-15 Years .....	72,000	9,000	1,600	5,250	....	87,850
16 and over.....	7,000	4,000	1,100	60	15	12,175
Totals .....	320,000	69,000	10,500	5,400	100	405,000

TABLE XIIIa.—PER CENT OF TOTAL PEACH TREES OF EACH AGE CLASS FOR EACH DISTRICT.

Age Class	Palisade	Clifton	Grand Jct.	Fruita	Loma	Percentage Totals
1- 6 Years .....	78.3	14.5	7.0	0.2	...	100.0
7-10 Years .....	79.0	19.0	2.0	...	...	100.0
11-15 Years .....	82.0	10.2	1.8	6.0	...	100.0
16 and over.....	57.5	32.9	9.1	0.5	...	100.0
Valley Totals .....	79.1	17.0	2.6	1.3	...	100.0

TABLE XIIIb.—PER CENT OF TOTAL PEACH TREES OF EACH DISTRICT WITH RESPECT TO AGE.

Age Class	Palisade	Clifton	Grand Jct.	Fruita	Loma	Entire Valley
1- 6 Years .....	8.4	7.2	22.8	1.5	20.0	8.5
7-10 Years .....	67.0	74.0	51.5	0.2	65.0	66.8
11-15 Years .....	22.4	13.0	15.2	97.2	...	21.7
16 and over.....	2.2	5.8	10.5	1.1	15.0	3.0
Percentage total .....	100.0	100.0	100.0	100.0	100.0	100.0

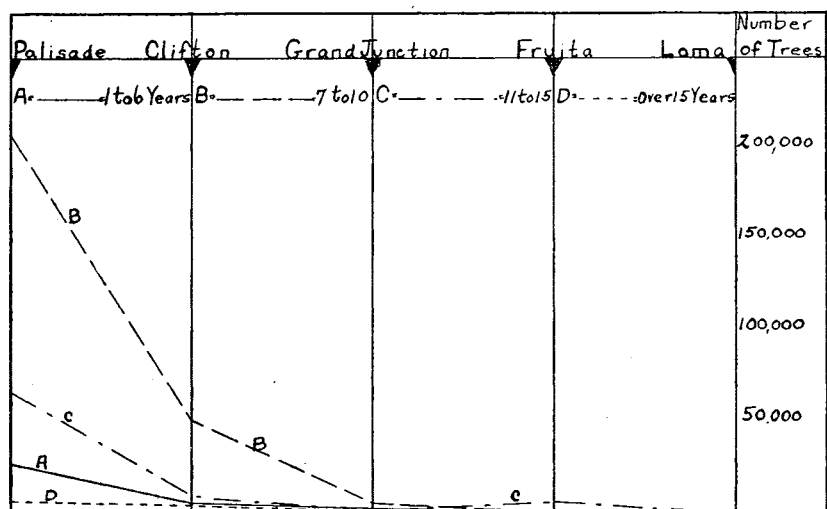
Diagram 12.—Number of Peach Trees in each Age Class for each District  
(Adapted from Table XII).



TABLE XIII.—PERCENTAGE OF PLUM TREES OF EACH DISTRICT FOR EACH AGE CLASS.

Age Class	Palisade	Clifton	Grand Jct.	Fruita	Entire Valley	Total Trees for Valley
1- 6 Years .....	8.5	2.6	9.6	8.5	6.4	385
7-10 Years .....	54.0	50.6	35.3	11.2	43.6	2,615
11-15 Years .....	30.5	38.4	10.6	22.7	27.7	1,660
Over 15 Years.....	7.0	8.4	44.5	57.6	22.3	1,340
Percentage totals .....	100.0	100.0	100.0	100.0	100.0	
Total Plum Trees.....	1,750	2,150	1,600	500	....	6,000

TABLE XIV.—PERCENTAGE OF APRICOTS OF EACH DISTRICT FOR EACH AGE CLASS.

Age Class	Palisade	Clifton	Grand Jct.	Fruita	Entire Valley	Total Trees for Valley
1- 6 Years .....	13.0	17.0	16.4	3.6	13.6	490
7-10 Years .....	45.0	45.0	42.8	18.6	43.0	1,550
11-15 Years .....	31.5	36.0	10.8	17.6	30.0	1,080
Over 15 Years.....	10.5	2.0	30.0	60.2	13.4	480
Percentage totals .....	100.0	100.0	100.0	100.0	100.0	
Total Apricot Trees.....	2,200	800	350	250	....	3,600

TABLE XV.—PERCENTAGE OF CHERRY TREES OF EACH DISTRICT FOR EACH AGE CLASS. TOTAL NUMBER OF TREES FOR ENTIRE VALLEY.

Age Class	Palisade	Clifton	Grand Jct.	Fruita	Loma	Entire Cherries for Valley	Total
1- 6 Years .....	12.8	7.3	19.0	51.3	97.0	18.2	2,360
7-10 Years .....	55.4	53.3	49.0	15.0	....	48.0	6,250
11-15 Years .....	17.0	35.8	19.0	7.0	....	21.0	2,730
Over 15 Years.....	14.8	3.6	13.0	27.7	3.0	12.8	1,660
Percentage Totals .....	100.0	100.0	100.0	100.0	100.0	100.0	
Total Cherries for Val.	5,300	3,175	3,150	1,075	300	....	13,000

## VARIETIES OF FRUIT GROWN IN THE GRAND VALLEY

## APPLES

Aiken Red	<sup>3</sup> Belleflower (Yellow)
Alexander	Ben Davis
<sup>2</sup> Arkansas (Mammoth Black	Ben Hur
Twig)	Benoni
<sup>2</sup> Arkansas Black	Bismarck
Babbitt	<sup>1</sup> Black Ben
Bailey Sweet	Blue Pearmain
<sup>3</sup> Baldwin	Buckingham
Barbour's Pride	Canada Red
Basket	Champion
Beitigheimer	<sup>3</sup> Chenango Strawberry

- |                                |                                  |
|--------------------------------|----------------------------------|
| Cole Quince                    | Minkler                          |
| Colorado Orange                | <sup>2</sup> Missouri (Pippin)   |
| Cooper Market                  | Mrs. Bryan                       |
| <sup>1</sup> Delicious         | Munson (Sweet)                   |
| Dominie                        | Newtown Pippin                   |
| Duling                         | <sup>2</sup> N. W. Greening      |
| <sup>3</sup> Early Harvest     | <sup>2</sup> Northern Spy        |
| Early Pennock                  | Nova Scotian                     |
| English Russett                | <sup>2</sup> Oldenburg (Duchess) |
| Fallowater                     | Opalescent                       |
| Fall Orange                    | Ortley (White Belleflower)       |
| Fall Pippin                    | <sup>2</sup> Paragon             |
| Fall Wine                      | Payne                            |
| <sup>2</sup> Fameuse           | Peck                             |
| Flora Bell                     | <sup>3</sup> Peewaukee           |
| French Pippin                  | Plumb Cider                      |
| Fulton                         | Rambo                            |
| <sup>1</sup> Gano              | Ramsdell                         |
| <sup>2</sup> Geniton           | <sup>3</sup> Red Astrachan       |
| Gideon                         | Red June                         |
| Golden Russett                 | Red Pearmain                     |
| <sup>3</sup> Gravenstein       | Red Stripe                       |
| <sup>2</sup> Grimes Golden     | R. I. Greening                   |
| Haas                           | Romanite                         |
| Hawley                         | Roman Stem                       |
| Hubbardston                    | <sup>1</sup> Rome Beauty         |
| Huntsman                       | Roxbury Russet                   |
| <sup>3</sup> Hyslop (Crab)     | Salome                           |
| Ingram                         | Santa Clara King                 |
| Iowa Blush                     | <sup>2</sup> Senator             |
| Isham's Sweet                  | Shackleford                      |
| <sup>3</sup> Jefferis          | Shockley                         |
| <sup>1</sup> Jonathan          | Siberian (Crab)                  |
| Keswick                        | Smith Cider                      |
| Kinnard                        | Smokehouse                       |
| <sup>2</sup> King David        | <sup>3</sup> Spitzenburg         |
| King (Tompkins County)         | Stark                            |
| <sup>2</sup> Lawver            | <sup>1</sup> Stayman             |
| Limbortwig                     | Steele's Red                     |
| <sup>3</sup> Livland Raspberry | Summer Pearmain                  |
| Lowell                         | Summer Pippin                    |
| Loy                            | Summer Queen                     |
| <sup>3</sup> Maiden Blush      | Sweet Bough                      |
| Mann                           | Thunderbolt                      |
| Martha                         | <sup>3</sup> Tolman (Sweet)      |
| <sup>2</sup> McIntosh          | <sup>3</sup> Transcendent (Crab) |
| <sup>3</sup> McMahon (White)   | Trenton Beauty                   |
| Milam                          | Twenty Ounce Pippin              |

<sup>3</sup> Utter Red	Williams
Vandevere Pippin	Willow Twig
<sup>3</sup> Wagener	Wine (Hay's Winter Wine)
Walbridge	<sup>1</sup> Winesap
<sup>2</sup> Wealthy	<sup>2</sup> Winter Banana
Westfield	Winter Paradise
<sup>3</sup> White Winter Pearmain	Wolf River
White Winter Pippin	<sup>3</sup> Yellow Transparent
<sup>3</sup> Whitney No. 20 (Crab)	<sup>2</sup> York Imperial

1—Recommended for commercial planting.

2—Varieties for semi-commercial, or, in certain localities, commercial planting.

3—Best adapted for home use and in some instances for semi-commercial use.

### APRICOTS

Breda	<sup>1</sup> Montgamet
Cole's Mammoth	<sup>1</sup> Moorpark
Colorado	<sup>1</sup> Newcastle
Early Golden	Peach
Hemskirke	<sup>1</sup> Royal
<sup>1</sup> Jackson	Russian
Japan	Smith's Early
Jones	Tilton

### CHERRIES

Baldwin	<sup>1</sup> Napoleon, s.
Bing's	Occident (Sultan)
Choisy	Olivet
Dyehouse	Oxheart, s.
<sup>1</sup> Early Richmond	Reine Hortense
<sup>1</sup> English Morello	<sup>1</sup> Royal Duke, s. a.
Knight, s.	Rocky Mountain (P. Bessayi)
Lambert, s.	<sup>1</sup> Sixteen-to-One, s.
Late Duke	Tartarian, s.
<sup>1</sup> Lewelling, s. (Black Republican)	<sup>1</sup> Windsor, s.
<sup>1</sup> May Duke	Wood (Gov. Wood), s.
<sup>1</sup> Montmorency	Yellow Spanish, s.

### CURRENTS

Albert (Prince Albert)	Pomona
<sup>1</sup> Cherry	<sup>1</sup> Red Cross
<sup>1</sup> Fay (Fay's Prolific)	<sup>1</sup> Red Dutch
Holland	Versaillaise
London	<sup>1</sup> White Grape (Imperial White)
<sup>1</sup> North-Star	Wilder
<sup>1</sup> Perfection	

## GOOSEBERRIES

Berkeley (Dwinelle)	Josselyn (Red Jacket)
Chataqua	<sup>1</sup> Oregon (Oregon Champion)
Champion (Mills Champion)	<sup>1</sup> Pearl
Crown Bob	Smith (Smith's Improved)
<sup>1</sup> Downing	Wellington (Wellington's
Industry	Glory)
<sup>1</sup> Houghton	Whitesmith (Sir Sidney Smith)

1.—Best for commercial planting.

s.—Sweet.

s. a.—Semi-acid.

## GRAPES

Agawam	Ives
America	Lindley
Alexandria	<sup>2</sup> Mission
<sup>2</sup> Black Hamburg	<sup>1</sup> Moore (Moore's Early)
Brighton	<sup>1</sup> Niagara
<sup>1</sup> Concord	Prentiss
<sup>2</sup> Cornichon	Salem
<sup>1</sup> Delaware	<sup>2</sup> Suldanina (Thompson's Seed-
Duchess	less)
<sup>2</sup> Flame Tokay	Wilder
Goethe	<sup>1</sup> Worden
Isabella	

## PEACHES

Alexander	Foster
Alton	Francis
Banner	Globe
Barnard	Gold Drop
<sup>1</sup> Belle of Georgia	Greensboro
Bergen	<sup>1</sup> Hale's Early
Bokhara	Indian Cling
<sup>1</sup> Carman	J. H. Hale
Chairs Choice	Krummel
<sup>1</sup> Champion	Lemon Cling
Chinese Cling	Lovell
<sup>1</sup> Crawford (Early)	Mamie Ross
Crawford (Late)	Mathew's Beauty
Crosby	Mayflower
Decker	Mellow St. John
Dewey	Moore's Favorite
Early Rivers	<sup>1</sup> Mountain Rose
Early York	Muir
<sup>1</sup> Elberta	New Prolific
Emma	Niagara
Favorite	Oldmixon Cling

Oldmixon Free  
<sup>1</sup>Orange Cling  
<sup>1</sup>Phillips Cling  
 Prince  
 Reeve's Favorite  
 Richmond  
 Russell

Smock  
 Sneed  
 Steven's Rareripe  
 Stump-the-World  
 Victor  
 Wheatland  
 Wonderful

1—Best for commercial planting.

2—Recommended only for home planting.

### PEARS

<sup>1</sup>Anjou  
 Anjou Dwarf  
 Angouleme (Duchess)  
 Angouleme (Duchess) Dwarf  
 Braseck  
<sup>1</sup>Bartlett  
 Bartlett Dwarf  
 Bosce  
 Boussock  
 Brandwine  
 Clairgeau  
<sup>1</sup>Clapp's Favorite  
 Columbia  
 Cornice  
 Easter  
<sup>1</sup>Flemish Beauty  
 Fred Clapp  
 Garber  
 Howell  
 Idaho  
<sup>1</sup>Kieffer  
 King Carl  
 Koonce  
 Krull

<sup>1</sup>Lawrence  
 Lawson  
 LeConte  
 Lincoln  
 Louise Bonne  
 Lucrative  
 Margaret  
 Mt. Vernon  
 Orange  
<sup>1</sup>P. Barry  
 Reihl's Best  
 Roosevelt  
 Rossney  
 Rutter  
<sup>1</sup>Seckel  
<sup>1</sup>Sheldon  
 Sugar  
 Summer Doyenne  
 Urboniste  
 Vicar  
 White Doyenne  
 Wilder  
 Winter Bartlett  
<sup>1</sup>Winter Nelis

### PLUMS

<sup>1</sup>Abundance  
 Agen  
 American Eagle  
 Archduke  
 Bavay  
 Bradshaw  
 Brittlewood  
<sup>1</sup>Burbank  
 Burwood  
 Chabot  
 Cheney

Climax  
 Clyman  
<sup>1</sup>Damson  
<sup>1</sup>DeSoto  
 Duane  
<sup>1</sup>Fellenberg (Italian Prune)  
 Forest Garden  
<sup>1</sup>German (Prune)  
 Giant (Prune)  
 Golden  
 Golden Beauty



<sup>1</sup> Green Gage	Rollingstone
Hawkeye	<sup>1</sup> Satsuma
Hudson	Shropshire
Hungarian Prune	Simon's
Imperial Gage	Sugar
<sup>1</sup> Lombard	<sup>1</sup> Surprise
Marianna	<sup>1</sup> Terry
Miner	Tragedy (Prune)
<sup>1</sup> Moore's Arctic	<sup>1</sup> Weaver
<sup>1</sup> Peach	Wickson
Pond	Wild Goose
Quackenboss	<sup>1</sup> Wolf
<sup>1</sup> Red June	<sup>1</sup> Wyant
Rockford	Yellow Egg

1.—Best for commercial planting.

#### BRAMBLES

(Blackberries, Dewberries and Raspberries)

##### Blackberries

Acme	Lawton
<sup>1</sup> Briton (Ancient Briton)	Mercereau
Early Harvest	<sup>1</sup> Minnewaska
Eldorado	<sup>1</sup> Snyder
Erie	Stone
Kittatiny	Wilson

##### Dewberries

Bartel	Mayes (Austin)
<sup>1</sup> Lucretia	

##### Raspberries

Brandwine (Wilmington)	McCormick (Mammoth Cluster), b.
<sup>1</sup> Columbian, p.	Nemaha, b.
<sup>1</sup> Conrath, b.	Ohio, b.
Cumberland, b.	Palmer, b.
<sup>1</sup> Cuthbert	St. Regis
Golden (Golden Queen)	<sup>1</sup> Shaffer, p.
<sup>1</sup> Gregg, b.	Soubegan
<sup>1</sup> Kansas, b.	<sup>1</sup> Turner
<sup>1</sup> King	Tyler
Loudon	
<sup>1</sup> Marlboro	

#### STRAWBERRIES

Aroma	Captain Jack
<sup>1</sup> Bederwood	Crawford
Brandywine	Cumberland
<sup>1</sup> Bubach	Downing

<sup>1</sup> Dunlap (Senator Dunlap)	Saunders
Gandy	Sharpless
<sup>1</sup> Glen Mary	Splendid
<sup>1</sup> Haverland	Thompson
Ivanhoe	<sup>1</sup> Warfield
Jessie	<sup>1</sup> Wm. Belt
<sup>1</sup> Marshall	Wilson
Parker Earle	Wolverton
<sup>2</sup> Progressive (Everbearing)	

1—Best for commercial planting.

2—Recommended for home use.

b.—Black caps.

p.—Purple Cane.

## THE FUTURE OUTLOOK FOR FRUIT GROWERS IN GRAND VALLEY

The readers of this bulletin will naturally wonder whether fruit growing in the Grand Valley has any future before it or not, whether the decline in productiveness, in prices obtained for fruit, and in the deterioration of some of the orchards will not permanently cripple the fruit industry in Grand Valley. It is undoubtedly true that fruit growing in the Grand Valley will be restricted to certain limited areas where fruit growing under all conditions will be reasonably safe. It is also true that a considerable portion of the land now in orchards will be put into agricultural crops because of the unfavorable conditions of these lands for fruit.

The Palisade and Clifton Districts, and part of the Grand Junction District, will very likely remain profitable fruit growing sections. For the Fruita and Loma Districts as a whole, the writers are less hopeful. Many of the orchards in the Fruita District are unprofitable at present, and more are reaching this state each year. A large part of the young orchard at Loma will probably never pay for itself. True, some of it will, with proper care, develop into profitable orchards, but as a district the odds are against this.

For profit, pears give the most promise. There is usually a good market for them, and they may be grown very well east of Grand Junction. Apples will always remain profitable, and, for a long-time average, may give as much return as pears.

The by-product problem must be solved before peach growing will be permanently profitable.

## SUMMARY

The fruit industry in Grand Valley, Mesa County, as a commercial enterprise is about 20 years old. Fabulous prices were ob-

tained for fruit eight or ten years ago. Wildcat speculation was prevalent for a time. The business is now in the process of re-adjustment from the speculative basis. Many orchards and many growers belonging to the speculative class are being eliminated in the re-adjustment. Land is getting back to sensible prices and a few years will no doubt see the business flourishing again.

There are nearly 16,000 acres of orchard in the Valley. Of this, over 10,000 are apples, 3,000 peaches, 2,400 pears, and less than 200 acres plums, apricots and cherries.

Probably more than 2,500 acres of orchard have been pulled out in the last five years, most of this being removed from the western portion of the Valley.

Most of the best orchards lie east of Grand Junction. The older ones are mostly in the Fruita District and many are being pulled out to make the land available for general farming.

Less than one-third of the fruit trees of Grand Valley are over twelve years old.

The orchards are, as a rule, too small. The average size for the Valley is slightly below nine acres.

Too many farmers grow fruit exclusively, and a year of poor prices or crop failure is disastrous to them.

More land must be devoted to general farming, stock raising and dairying and the average fruit grower must grow something besides fruit in order to be most successful.

Marketing is the worst problem the growers have to solve.

The pack of fruit must be standardized and poor fruit utilized in by-products.

Clean cultivation has been practiced too much, but is now giving way to the more sensible system of cover cropping.

Due to over irrigation, the water table has risen in some places to within 5 feet, or less, of the surface. Many orchards have been ruined by seepage and a drainage system is probably to be installed throughout the entire Valley to give relief from this trouble.

The codling moth is very bad. Most growers spray four to six times with arsenate of lead, using 4 or 5 pounds of paste to 100 gallons of water. The average cost of spraying apples per acre per season is \$20.00.

Peaches are generally sprayed for twig borer with lime-sulphur just before the buds begin to open. Some orchardists spray with arsenate of lead shortly after the leaves come out.

The ravages of pear blight have some years been great. Many acres of good pear orchard have been ruined by this disease. The industry, however, continues to yield good profits.

The average cost of production per box of fruit, laid down at the platform, including all expenses, as determined from the estimates given, is, for apples 61.2c, pears 60.5c, peaches 31.2c.

The average number of cars of fruit shipped out of the Grand Valler for the years 1911 to 1915, inclusive, is about 2,525 per year.

The average yield per acre for the years 1911 to 1915 has been about 25% of a car for apples, 30% of a car for pears, and 55% of a car for peaches per year for all bearing orchard in the Valley.

About 30% of all the irrigated land on the north side of the river is planted to fruit trees, while only about 5% of the irrigable land south of the river is set to orchard. Over 80% of the orchard in the Valley is located north of the river, less than 20% being on the south side.

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