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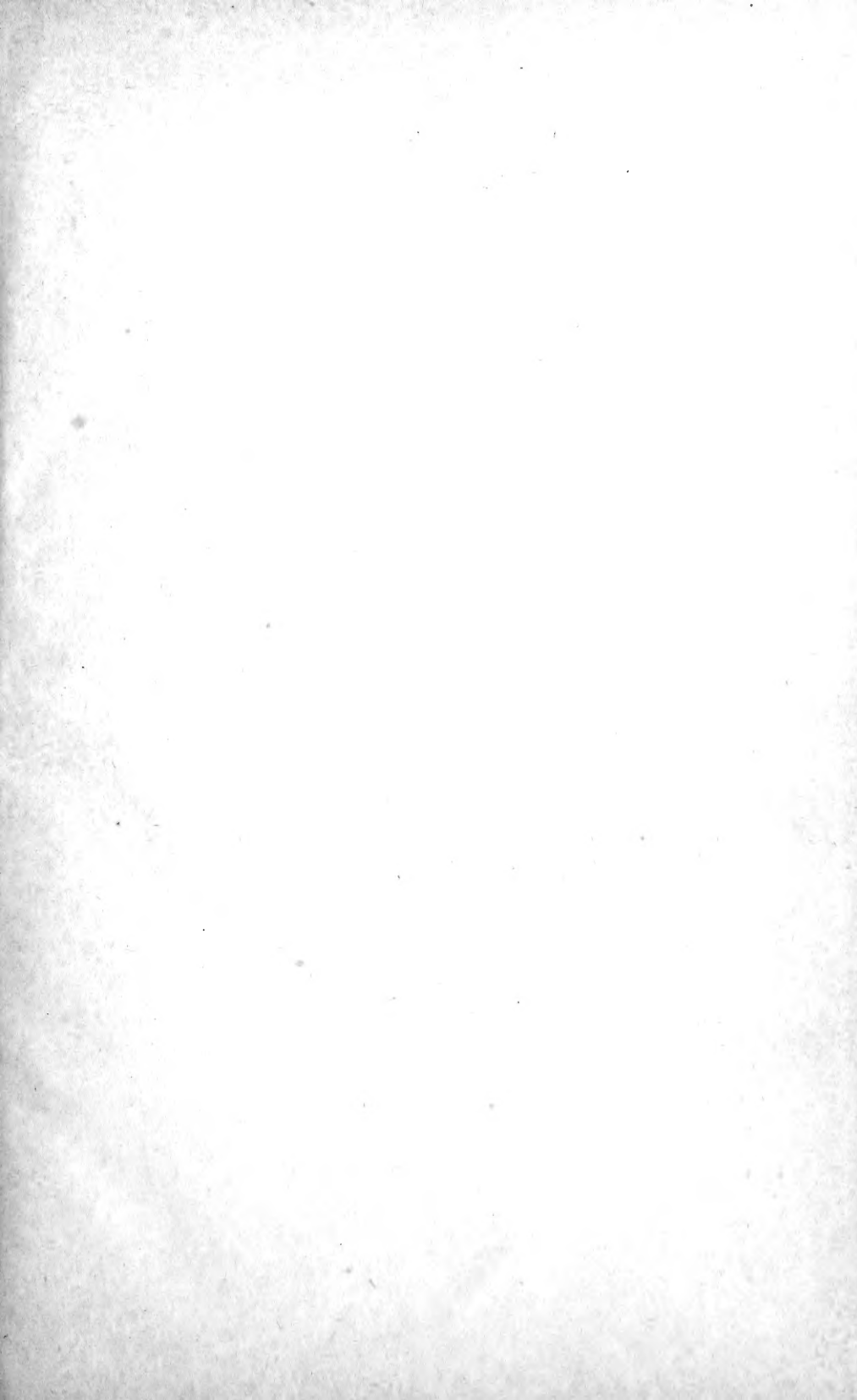
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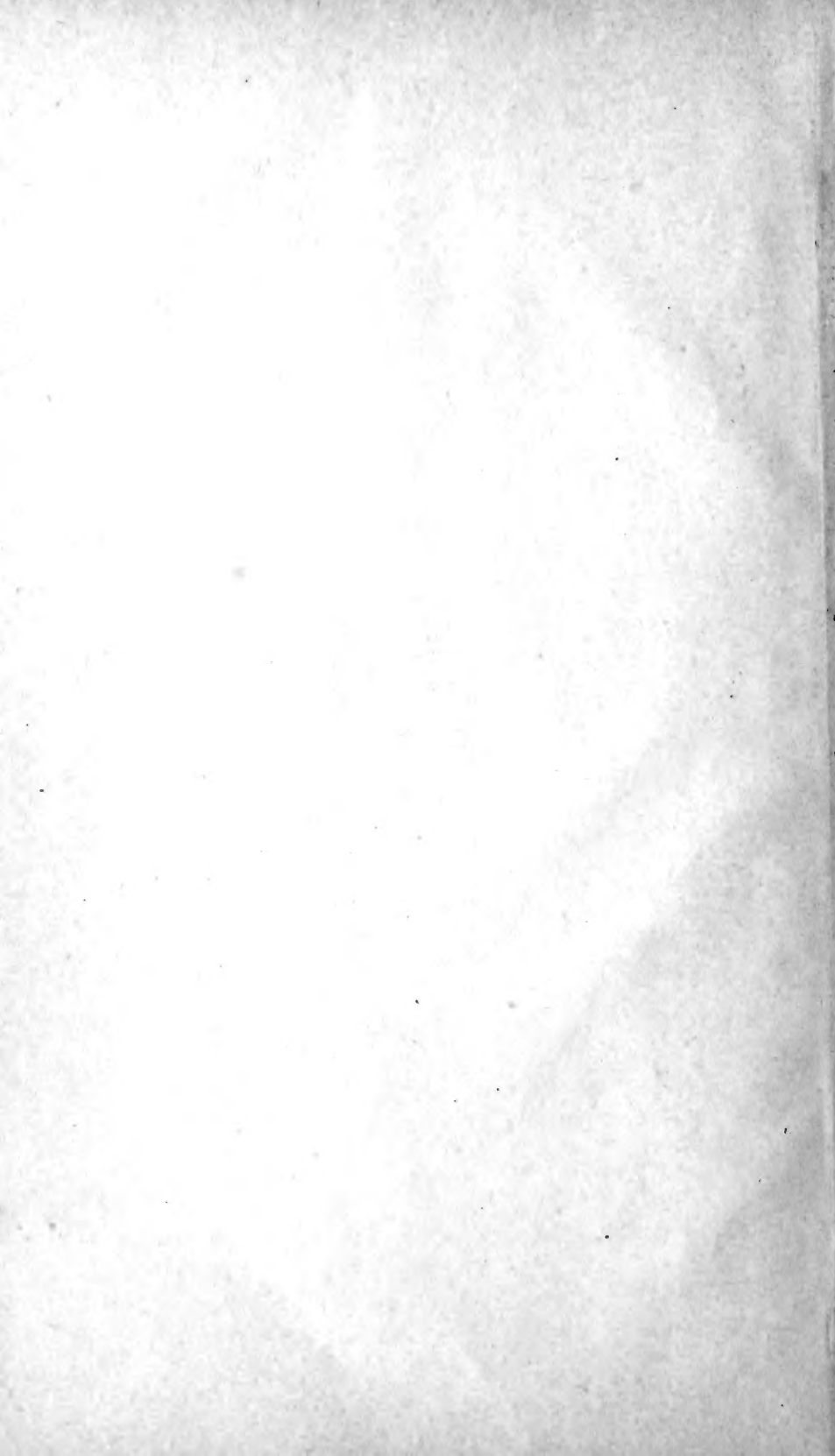
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Compliments of _____

William H. Barnes,

Secretary.





THE APPLE.

THE KANSAS APPLE.

THE BIG RED APPLE.

THE LUSCIOUS, RED-CHEEKED FIRST LOVE OF THE FARMER'S BOY.
THE HEALTHFUL, HEARTY HEART OF THE DARLING DUMPLING.

WHAT IT IS.

HOW TO GROW IT.

ITS COMMERCIAL AND ECONOMIC
IMPORTANCE.

HOW TO UTILIZE IT.



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COMPILED AND REVISED BY THE
KANSAS STATE HORTICULTURAL SOCIETY,
WILLIAM H. BARNES, SECRETARY,
State Capitol, Topeka, Kan.

1898.



JUL 23 1901
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Det. 17, 1911, N.S.P.

THE APPLE! WHAT IT IS.

DEFINITION.

The fleshy pome or fruit of a rosaceous tree (*Pyrus malus*), the origin of which is probably the wild crab-apple of Europe, cultivated in innumerable varieties in the temperate zones.

It is scarcely known in the wild state, but as an escape from cultivation its fruit becomes small, acid, and harsh, and is known as the crab; the cultivated crab-apple is the fruit of other species of *Pyrus*. Of the cultivated crabs there are the Siberian (*Pyrus prunifolia*), the Chinese (*Pyrus spectabilis*), and the Cherry-crab (*Pyrus baccata*), all natives of northern Asia.

The apple was first introduced into America from England, in 1629, by the governor of Massachusetts Bay.

LAWS PERTAINING TO APPLE ORCHARDISTS.

Extracts from General Statutes of Kansas, 1897.

CUTTING OR DESTROYING FRUIT- OR SHADE-TREES.

(Vol. 2, p. 374.) § 423. If any person shall cut down, injure or destroy or carry away any tree placed or growing for use, shade or ornament, or any timber, rails or wood standing, being or growing on the land of any other person, or shall dig up, quarry or carry away stones, ore or mineral, gravel, clay or mold, roots, fruits, or plants, or cut down or carry away grass, grain, corn, flax or hemp in which he has no interest or right, standing, lying or being on land not his own, or shall knowingly break the glass or any part of it in any building not his own, the party so offending shall pay to the party injured treble the value of the thing so injured, broken, destroyed or carried away, with costs, and shall be deemed guilty of a misdemeanor, and shall be subject to a fine not exceeding \$500.

DESTRUCTION BY FIRE.

(Vol. 2, p. 372.) § 415. If any person shall wantonly and wilfully set on fire any woods, marshes or prairies so as thereby to occasion any damage to any other person he shall upon conviction be punished by fine not exceeding five hundred dollars and not less than fifty dollars, or by imprisonment in the county jail not more than six months and not less than ten days, or by both such fine and imprisonment.

DECEPTION IN SALE OF TREES, PLANTS, ETC.

(Vol. 2, p. 318.) § 126. Any person or persons who shall misrepresent, deceive or defraud any person or persons in the sale of any fruit, shade or ornamental tree or trees, or any vine, shrub, plant, bulb, or root, by substituting inferior or different varieties, or who shall falsely represent the name, age or class of any fruit, shade or ornamental tree or trees, or any vine, shrub, plant, bulb, or root, shall be guilty of a misdemeanor, and on conviction shall be fined not less than \$10 nor more than \$200, or by imprisonment in the county jail not less than thirty days nor more than six months, or by both such fine and imprisonment, and shall be liable to the party or parties injured thereby in treble the amount of all damages sustained, to be recovered in any court having jurisdiction thereof.

TO PRESERVE ORDER AT HORTICULTURAL FAIRS.

(Vol. 2, p. 955.) § 4. All county agricultural and horticultural societies, duly incorporated under the laws of this state, shall have power during the time of holding their fairs to appoint such police force and make such laws and regulations as shall be deemed necessary for the well ordering and government of the society.

WEIGHTS AND MEASURES.

(Vol. 2, p. 944.) § 11. Green apples shall weigh forty-eight pounds per bushel. Dried apples shall weigh twenty-four pounds per bushel.

AN ACT FOR THE PROTECTION OF BIRDS.

(Vol. 2, p. 934.) § 1. The owner of an orchard may at any time shoot blue-jays, orioles, or yellowhammers.

THE APPLE.

THE CHEMISTRY OF THE APPLE TREE.

Written specially for "The Kansas Apple," By Prof. E. H. S. BAILEY, Chemist at the Kansas State University.

In the cultivation of the apple tree, which, like most plants, gets its nourishment from two sources, the soil and the atmosphere, these must be first considered. From the soil come the mineral ingredients, those that are given back to the soil when the plant is burned, and from the atmosphere come the ingredients of no less importance in the growth of the tree, but which mostly disappear as invisible gases upon combustion. Upon the character of this soil and upon the climate, a general term that may be said to cover the conditions of the atmosphere, depend the success of the horticulturist. In addition to this, insect pests are liable to constantly menace the crop.

In the making of soils, a process that is constantly going on, the most important agents are water, air, frost, sunshine, and the action of living organisms. By this combined action, the mountain, with its rich store of mineral matter, is disintegrated, its constituents are partly dissolved in the water and partly carried mechanically to the plains below; the air is distributed through the soil; seeds are dropped; the living animal forms begin to multiply; the soil is enriched, and gradually it begins to be in a condition suitable to bear the simpler forms of vegetable life, which in turn decaying, add to the richness of the soil.

Furthermore, the mechanical condition of the soil has much to do with the successful growth of the plant. If the soil is extremely fine, it is liable to become so compact that the rootlets cannot easily penetrate it, when it is of such a composition as to bake readily in the sun; if very coarse, like gravel, there is not a sufficient capacity to retain moisture. It should, however, be porous enough to allow the air to penetrate it, for upon the aeration of the soil depends much of its fertility. We loosen the soil about the roots of plants to allow the air to penetrate and give an opportunity for the chemical changes constantly undergoing in the soil. Then, too, the work of the earthworms in loosening the soil, and thus adding to its porosity, should not be overlooked. In this soil workshop, too, live and labor certain minute organisms that make it their business to enrich the soil by helping the rootlets to assimilate the nitrogen of the air.

Since the soil is composed mostly of ingredients that come from the decomposition of rocks, it follows that it must be of very complex composition. Fortunately, however, there are only a few of the ingredients of the soil that are of interest to the agriculturist, as only a few of the elements, as they are called, go to make up the plant structure, or at least only a few are essential ingredients of the plant. Nitrogen, though very abundant in the air, is not abundant in the soil. In fact, the soil has to depend largely on the nitrogen compounds that are washed out of the atmosphere in small quantities by the rain. Another source of nitrogen is the action of certain bacteria, that make little sacs on the rootlets and, living on the juices of the plants, fix the nitrogen of the air, and thus fertilize the soil; especially on plants of the leguminous family, as peas, beans, and clover.

Silicon, which with oxygen makes ordinary sand, is essential to the growth of

plants and is everywhere found in abundance. Sulphur, united with oxygen and the metals to form sulphates, is generally abundant enough. The same may be said of chlorine, which, united with sodium or potassium, is always present in our prairie soils. Phosphorus, as it occurs in the phosphates, is one of the most essential ingredients of a fertile soil. Calcium and magnesium are found in combination as carbonates and sulphates, and, though essential, are usually abundant, especially where limestone rocks underlie the soil and outcrop in so many places. Potassium is found united with chlorine or sulphuric acid. It is one of the elements that is most liable to be exhausted from the soil by a succession of crops. Sodium exists almost everywhere. It is one of the elements of common salt, and, though much like potassium, cannot take the place of the latter in plant nurture. Iron is abundant and at the same time necessary in small quantities. The elements above mentioned, together with oxygen, are to be found in the ashes of plants. Besides, there are two elements that come largely from the atmosphere, namely carbon and hydrogen, which, united with oxygen, make up the bulk of the plant. Thus, wood is a substance containing carbon, hydrogen, and oxygen, with small quantities of nitrogen and mineral salts. The mineral salts represent about one per cent. of air-dried wood.

Having considered in a general way the constituents of the plant, and having noticed the source of each of these constituents, it may be of interest to look at the composition of the soil as revealed by chemical analysis. "A" is the analysis of a soil from Finney county, as made in the laboratory of the Kansas State University, by the author. "B" is a soil from Wyandotte county, as reported in the report of the Kansas State Board of Agriculture for 1874. "C" is a prairie soil from Dakota, as reported by Prof. E. Richards, of the department of agriculture.

	"A"	"B"	"C"
Silica and insoluble.....	71.66	82.16	69.82
Iron and aluminum oxides.....	6.55	6.70	12.05
Calcium oxide.....	4.41	.68	.85
Magnesium oxide.....	1.02	.06	.87
Phosphoric anhydride.....	.18	.08	.11
Chlorine.....	.01	.03	.03
Potassium oxide.....	.75	.05	.72
Sodium oxide.....	.25	.11	.94
Sulphuric anhydride.....	.06	.39	.12
Volatile and organic matter.....	3.98	5.44	8.90
Moisture.....	9.67	3.80	6.27
Undetermined, carbonic acid, etc.....	1.48	.30	.22
	100.00	100.00	100.00

In some cases it happens that there is a sufficient quantity of an ingredient in the soil, but it is not in a sufficiently *soluble* form to be available. It will be noticed that in the analyses quoted above the amount of the necessary constituents of the soil to plant growth is not in any case large. The nitrogen may be present in the volatile and organic matter, and upon the proportion of this complex organic matter very often depends to a great extent the fertility of the soil.

Some experiments made at one of the agricultural experiment stations upon the effect of "apple stock," that is, young trees raised for nursery purposes, on the soil, showed that in eleven tons of such stock the following quantities of ingredients were removed from the soil:

Silica.....	50.6 lbs.	Lime.....	138.6 lbs.
Phosphoric acid.....	21.4 "	Magnesia.....	23.7 "
Sulphuric acid.....	14.3 "	Soda.....	21.3 "
Chlorine.....	1.3 "	Potash.....	27.1 "
Carbonic-acid gas.....	94.9 "		
Iron oxide.....	6.1 "	Total.....	399.3 lbs.

This is no inconsiderable quantity of material to be removed by a single crop.

Professor Goessmann, in discussing the ash of fruits, gives the following analysis of the ash of the Baldwin apple; this would represent the mineral matter taken from the soil by the fruit: Potash, 63.54 per cent.; soda, 1.71; lime, 7.28; magnesia, 5.52, and phosphoric acid, 20.87. Comparing this with the ash of other fruits, it is seen that the amount of potash required is larger than in the case of other fruits except plums and peaches, and the amount of phosphoric acid is high, but not as high as in the case of some berries. The application is obvious; in order to successfully raise apples there must be an abundance of potash and of phosphoric acid in the soil, and these ingredients must be in an available form.

If we compare the apple and the pear by an analysis for fertilizing constituents, or such constituents as are usually introduced into deficient soil by means of fertilizers, we have the following table: 1000 parts of the fruit contain, in the case of each,

	H ₂ O	N	Ash	K ₂ O	Na ₂ O	CoO	MgO	P ₂ O ₅	SO ₃	SiO ₂
Apple.....	831	0.6	2.2	0.8	0.6	0.1	0.2	0.3	0.1	0.1
Pear.....	831	0.6	3.3	1.8	0.3	0.3	0.2	0.5	0.2	0.1

When we study the composition of the apple, to determine the "proximate principles," as they are called, it is noticed that we have the constituents mentioned in the discussion of the elements contained in the fruit combined to form various substances; thus:

	Apples.	Pears.	Cherries.	Peaches.
Water.....	82.04	83.95	75.73	84.99
Sugar.....	6.83	7.00	13.11	1.58
Free acid.....	.85	.07	.35	.61
Albuminous substances.....	.45	.26	.90	.46
Pectous substances.....	.47	3.28	2.29	6.31
Soluble.....	14.96	10.90	17.25	9.39

Free acid in fruits is not neutralized by sugar, but it is well known that an abundance of sugar will cover up the sour taste of a fruit. The constituents above noted are mostly found in the expressed juice of the fruit, and give it its characteristic flavor. Without the sugar in these juices it would not be possible to make any alcoholic beverages from them. In the process of fermentation, in the case of apple juice, we have first the change of the sugar to alcohol and carbonic-acid gas, which imparts to cider its characteristic taste and tang. Afterwards, the alcoholic solution, in the presence of the organic matter, is subjected to what is called acetic fermentation; that is, the vinegar plant grows at the expense of the organic matter in the cider, and this beverage is converted into vinegar, containing acetic acid. It is a familiar fact that the change does not readily take place except when cider is exposed to the air, and this is shown to be true from a chemical standpoint, as the cider really is oxidized to make the vinegar; that is, it takes up oxygen from the air.

The greater the proportion of sugar, the greater the quantity of alcohol, the stronger the vinegar will be. Grapes contain more than twice as much sugar as apples; hence, a wine that is made from them is stronger in alcohol than a cider made from apples. Cherries, as will be seen by reference to the table above, contain a large amount of sugar; hence their use in making cherry brandy, which contains a large per cent. of alcohol. It should be said, however, that in order to make brandy the cherry juice must be distilled. In this respect the process is similar to that employed in making apple brandy.

After the juice has been extracted from the apples the pomace that remains is sometimes used as a fertilizer. This is valuable chiefly on account of the mineral salts contained in it. An analysis of the pomace shows that it contains: Water, 69.90 per cent.; ash, .71; albuminous substances, 1.58; fiber, 4.87; nitrogen, free extract, 21.24; fat, 1.71.

The acid of the apple is usually considered to be malic acid, but really there are several acids mixed together. It is a mild and agreeable vegetable acid, and its presence adds much to the flavor of the fruit. The pectous and albuminous substances are those that assist in the formation of fruit jellies. Some of these substances are liquid when hot, and gelatinize on cooling; by too long boiling they lose this property of gelatinizing; hence the precaution that is taken in the making of fruit jellies not to boil the juice too long.

The subject of the ripening of fruits like the apple has been extensively studied, as has also that of the subsequent decay. According to recent researches, early varieties of apples contain little starch when picked, and do not keep well. The season, soil, and age of the tree affect the composition of the fruit. It has been shown that sugar is sure to be formed from the starch in the process of ripening, after the fruit is taken from the tree, and during the winter the cane sugar is gradually, and finally almost entirely, changed to directly-reducing sugar. The maximum sugar content is reached earlier the earlier in the season the apple ripens. Late winter varieties reach this point as late as November. There is much starch in the latter when picked, which gradually changes to sugar on keeping. This process is analogous to the ripening of the banana. This fruit is picked while green, and from it is made by the natives of South America a flour which is a good farinaceous food, and readily answers the place of the starchy grains. We are familiar with the fact that as the fruit ripens it contains large quantities of sugar, and is edible uncooked, which fact is usually not true of starchy foods.

The subject of the decay of the apple has been discussed in a very interesting way in the *Popular Science Monthly* for May, 1893, by Byron D. Halsted. Though chemical changes take place here, also, and the apple is finally resolved mostly into carbonic-acid gas, water, and mineral salts, yet these changes are brought about by the action of various fungi which find a soil favorable to their growth in the apple pulp.

Though apples are considered digestible and wholesome, their digestibility is much increased by cooking. This is especially true if some of the starch is not converted to sugar, for, as noted above, starch, to be readily assimilated in the system, should be cooked. There is probably no fruit that is so uniformly wholesome and so deservedly popular with all classes as the apple. The apple and pear were known in England before the conquest, and, indeed, probably before the Saxon invasion. They have been gradually "improved" from the wild crab-apple of Europe. It is stated on good authority that there is no country on the globe so well adapted to the growth of this fruit as the temperate regions of North America, and this seems to be demonstrated by the fact that the apples of the United States are superseding the native fruit in most of the civilized countries.

ANALYSES OF THE ASH OF THE APPLE.

	Sap-wood.	Heart-wood.
Potash	16.19	6.620
Soda	3.11	7.935
Chloride of sodium .....	.42	.210
Sulphate of lime .....	.05	.526
Phosphate of peroxide iron .....	.80	.500
Phosphate of lime	17.50	5.210
Phosphate of magnesia .....	.20	.190
Carbonic acid	29.10	34.275
Lime	18.63	35.019
Magnesia	8.40	6.900
Silica	1.65	.700
Organic matter	4.60	2.450
Totals	100.65	100.535

ANALYSES OF APPLES.

One hundred pounds of average apples contain the following:

No. 1.		No. 3.	
Fiber.....	3.2 lbs.	Water.....	85.0 lbs.
Gluten, fat, and wax.....	.2 "	Sugar.....	7.6 "
Casein.....	.16 "	Acid.....	1.0 "
Albumen.....	1.4 "	Albuminous substances.....	.22 "
Dextrine.....	.7 "	Insoluble matter.....	1.83 "
Sugar.....	8.3 "	Pectous substances.....	3.88 "
Malic acid.....	.3 "	Ash.....	.47 "
Water.....	82.66 "		100 lbs.
Error.....	.08 "		
	100 lbs.		

No. 2.

Nitrates.....	5 lbs.
Carbonates.....	10 "
Phosphate.....	1 "
Water.....	84 "
	100 lbs.

WEIGHT OF APPLES.

Thirty-three hundred three-bushel barrels were weighed. The average net weight, barrel not included, was: Ben Davis, 134 pounds, or $44\frac{2}{3}$ pounds per bushel; Missouri Pippin, $136\frac{3}{4}$ pounds, or $45\frac{5}{8}$ pounds per bushel; Winesap, $144\frac{3}{4}$ pounds, or $48\frac{1}{4}$ pounds per bushel. Apples vary in weight in different seasons. Jonathans weighed in quantity three seasons give 134, 136 and 140 pounds per barrel, averaging $49\frac{5}{8}$ pounds per barrel. These weights are all net; they do not include the weight of the barrel.

TIME OF BLOOMING IN LEAVENWORTH COUNTY.

Observations taken through a period of eight years—1890 to 1897—show the Jonathan, Missouri Pippin, Winesap and Ben Davis in full bloom on April 25, 29, 30, 20, 22, 20, 22, 26.

SOME APPLE-PRODUCING STATES.

Quantity of apples grown in 1889 in states having more than Kansas, taken from the United States census of 1890:

1. Ohio.....	13,789,278 bus.
2. Michigan.....	13,154,626 "
3. Kentucky.....	10,679,389 "
4. Illinois.....	9,600,785 "
5. Indiana.....	8,784,038 "
6. Missouri.....	8,698,170 "
7. New York.....	8,493,846 "
8. Virginia.....	8,391,425 "
9. North Carolina.....	7,591,541 "
10. Pennsylvania.....	7,552,710 "
11. Tennessee.....	7,283,945 "
12. Iowa.....	5,040,352 "
13. West Virginia.....	4,439,978 "
14. Kansas.....	3,713,019 "

AMERICAN APPLES ABROAD.

Furnished by Walter Wellhouse, through courtesy of Simons, Shuttleworth & Co., Liverpool.

DATE.	PORTS OF EXPORT.							
	Figures given represent barrels.							
	New York.	Boston.	Mon-treal.	Port-land.	Balti-more.	Phila-delphia.	Halifax.	St.Johns.
1897.								
Aug. 7	201							
" 14	232							
" 21	829							
" 28	986	30	592					
Sept. 4	2,178	653	793					
" 11	6,608	897	2,470					
" 18	7,873	908	6,178					
" 25	9,435	1,622	9,623				2,106	
Oct. 2	10,448	1,849	9,306				7,000	
" 9	16,233	3,823	8,279					
" 16	18,193	7,738	8,285				3,218	
" 23	24,930	15,212	8,450				9,146	
" 30	24,237	19,680	16,806				5,410	
Nov. 6	22,469	19,237	31,811			390	4,216	
" 13	15,747	16,201	20,816					
" 20	27,219	9,526	31,441			363	5,000	
" 27	18,261	8,152	8,463	9,431		1,045	1,285	
Dec. 4	15,619	8,449		6,889		200	5,610	
" 11	11,231	6,799		6,605			718	
" 18	5,706	3,244		300			330	
" 25	6,588	1,939		3,735				
1898.								
Jan. 1	4,349	3,521		7,469				
" 8	8,749	3,643		13,775			7,000	
" 15	11,158	5,587		9,920			8,500	
" 22	8,265	4,756		10,979				
" 29	10,979	4,376		5,634		480	952	
Feb. 5	3,463	3,997		7,950		200	3,046	1,012
" 12	6,689	2,407		7,687	55			1,523
" 19	4,187	5,060		6,005			2,740	
" 26	6,613	2,293		4,704		350	2,108	1,500
Mar. 5	4,886	677		6,832				
" 12	6,005	2,375		4,963		230	2,702	
" 19	6,497	1,048		6,294				135
" 26	7,730	4,368		299				
April 2	7,142	2,921		4,296				
" 9	6,863	2,163		2,077		685	4,999	
" 16	5,783	293		1,258				
" 23	3,093	379					682	
" 30	1,190	519					1,270	
May 7	1,500							
June 11	1,500							
Totals....	361,894	176,322	163,313	126,261	55	3,943	78,038	4,170

THE APPLE BUSINESS.

By J. G. THOMPSON, of Edwardsville, Kan.

Often the title of a book or essay gives little information as to what will follow, and under "The Apple Business" there are a variety of subjects, on any one of which an essay might be written. In this short paper I shall speak of our foreign markets. A Kansas apple in London is a long way from home. But it is there, and not at all disconcerted by its strange surroundings. What is our apple doing there? Was it imported as a curiosity? Is it there as evidence of some venture or speculation? Neither; it has passed the experimental stage and is on a perfectly legitimate errand. It has gone over for English gold and will send the same back to its Kansas home. Now comes the interesting part, which makes business of the transaction. If profitable, it means prosperity: and a wave of prosperity is what the whole country needs, and when the wave comes there will be a lot of folks who will want to make the inundation permanent. Apples, on arriving in London or Liverpool, are sold at auction on the docks, immediately on arrival, usually in twenty-barrel lots. Of each lot two barrels are opened, one is poured out on a table, and one has the head removed

AMERICAN APPLES ABROAD.

European receivers of American apples, represented by Chas. Forster, 76-78 Park Place, N. Y

DATE.	PORTS OF IMPORT.					Total.
	Figures given represent barrels.					
	Liverpool.	London.	Glasgow.	Hamburg.	Various.	
1897.						
Aug. 7	168		33			201
" 14	185		47			232
" 21	455		374			829
" 28	1,113		495			1,608
Sept. 4	3,044		580			3,624
" 11	7,605		2,370			9,975
" 18	10,933	70	3,813		143	14,959
" 25	12,960	2,494	6,425	657	250	22,786
Oct. 2	13,286	7,774	5,167	1,804	572	28,603
" 9	16,325	11,252	6,499	3,747	512	28,335
" 16	20,530	5,461	7,473	3,648	322	37,434
" 23	29,381	13,047	8,709	6,391	210	57,738
" 30	26,641	16,055	14,619	8,432	366	66,113
Nov. 6	39,615	9,449	18,897	8,371	1,791	78,123
" 13	33,631	4,338	7,579	6,650	566	52,764
" 20	29,167	11,226	18,288	13,755	1,113	73,549
" 27	26,308	7,169	3,588	7,686	1,886	46,637
Dec. 4	18,091	8,724	3,154	6,597	231	36,797
" 11	14,050	2,469	4,766	3,829	239	25,353
" 18	4,613	2,794	211	1,475	487	9,580
" 25	7,468	2,733	1,106	616	339	12,262
1898.						
Jan. 1	11,949	2,196		617	577	15,339
" 8	19,486	9,428	709	2,644	900	33,167
" 15	17,747	11,952	1,450	4,011	5	35,165
" 22	16,332	4,855		1,316	567	23,100
" 29	11,974	5,174	1,539	3,601	142	22,430
Feb. 5	3,546	4,987	417		718	19,668
" 12	12,584	3,709	1,101	673	294	18,361
" 19	12,320	5,160	521		41	18,042
" 26	10,234	4,656	1,353	1,325		17,568
Mar. 5	8,431	3,284	100	505	75	12,395
" 12	9,192	6,389	424	270		16,275
" 19	8,671	5,026	117	160		13,974
" 26	7,747	4,078	381		191	12,397
April 2	9,788	4,187	271		113	14,359
" 9	6,917	8,493	1,192		185	16,787
" 16	5,049	2,091	60		134	7,334
" 23	2,059	2,095				4,154
" 30	543	2,436				2,979
May 7		1,500				1,500
June 11		1,500				1,500
Totals.....	490,138	198,281	123,828	88,780	12,969	913,996

so that the faced end may be seen. This is called a "show," and in the account of sales the "shows" are charged for at the rate of one shilling each.

I have just received the apple catalogue of Woodall & Co., of Liverpool, England, giving a list of sales made by them of 2451 barrels of American apples, from the 3d to the 10th of this month [December, 1897]. This catalogue gives the mark, brand or owner's name on barrel, the name of the variety, condition of fruit, and whether tight or loose in the barrel, the name of the vessel on which the fruit arrived, the point from which it was shipped, and the gross proceeds of the sales of these 2451 barrels—1047 were from Canada and 1404 from the United States. Last year I sold for export 1000 barrels of apples. The buyer told me it was very difficult to carry barreled apples across the water in good condition. And that, owing to the peculiar motion of the ship, apples which were tight when loaded would be loose and bruised on arrival at Liverpool. You may judge of the correctness of this statement when I tell you that, in the account of sales of 153 barrels, 142 are reported as loose and 11 tight. They are like this: One barrel Ben Davis, \$3.80; freight, \$1.35; commission, 20 cents; net proceeds, \$2.25. This is supposing they should reach the other side loose.

COMPARISON OF SEASONS, 1881 TO 1898.

DATE.	PORTS OF EXPORT. Figures represent barrels.									
	New York.	Boston.	Montreal.	Portland.	Halifax and St. Johns.	Philadelphia.	Baltimore.	Newport News.	Norfolk.	Annapolis.
1880-81.....	599,200	510,300	145,276	39,908	24,250	9,872	.....	.....	.....	.....
1881-82.....	75,889	65,093	56,433	6,497	13,805	.....	.....	.....	.....	21,535
1882-83.....	169,570	102,409	64,390	16,890	18,542	3,900	.....	.....	.....	19,893
1883-84.....	53,048	7,145	7,445	9,811	3,758	325	.....	.....	.....	.....
1884-85.....	256,314	307,130	84,487	71,460	41,207	.....	.....	.....	.....	8,612
1885-86.....	466,203	221,724	68,716	87,301	37,982	186	.....	.....	.....	3,161
1886-87.....	175,595	303,479	106,713	100,569	94,606	.....	.....	.....	.....	26,965
1887-88.....	275,696	163,916	93,058	25,215	32,652	.....	.....	.....	.....	17,884
1888-89.....	474,337	382,199	291,307	145,825	94,691	860	.....	.....	.....	18,190
1889-90.....	169,557	132,589	162,526	122,433	53,627	.....	.....	.....	.....	37,030
1890-91.....	76,503	23,123	182,095	80,365	89,190	.....	.....	.....	.....	.....
1891-92.....	537,247	339,964	320,457	163,145	87,379	550	72	1,337	215	.....
1892-93.....	218,037	204,138	429,243	235,395	116,725	.....	.....	.....	.....	.....
1893-94.....	29,396	4,796	56,255	49,344	35,058	.....	.....	.....	.....	.....
1894-95.....	221,398	523,123	273,353	155,878	264,410	.....	.....	.....	.....	.....
1895-96.....	230,705 *13,610	84,771	128,027	*1,861	141,955	.....	.....	.....	.....	.....
1896-97.....	570,327	1,015,029	700,274	221,350	409,733	3,133	.....	.....	.....	.....
1897-98.....	361,894	176,322	163,313	126,261	82,208	3,943	55	.....	.....	.....

DATE.	PORTS OF IMPORT. Figures represent barrels.					
	Liverpool.	London.	Glasgow.	Hamburg.	Variou.	Total.
1880-81.....	839,444	177,936	216,391	.....	95,036	1,328,806
1881-82.....	133,784	46,147	59,266	.....	55	239,252
1882-83.....	253,432	46,975	81,269	.....	13,318	395,594
1883-84.....	46,661	4,843	29,685	.....	343	81,532
1884-85.....	491,898	123,081	137,631	.....	16,590	769,210
1885-86.....	537,695	147,102	176,445	.....	24,031	885,273
1886-87.....	468,553	187,840	138,756	.....	12,775	807,924
1887-88.....	346,557	104,072	139,517	.....	18,275	608,421
1888-89.....	790,502	279,374	272,068	.....	64,465	1,407,409
1889-90.....	418,850	128,248	116,449	.....	14,115	677,762
1890-91.....	252,548	116,705	80,772	.....	1,260	451,285
1891-92.....	917,535	224,356	282,553	.....	25,892	1,450,336
1892-93.....	798,291	174,405	220,790	.....	10,052	1,203,538
1893-94.....	101,205	32,581	38,524	.....	2,530	174,841
1894-95.....	853,198	388,535	173,312	.....	23,110	1,438,155
1895-96.....	410,596 *11,342	196,184 *2,458	127,942 *1,771	.....	16,533	751,255 *15,471
1896-97.....	1,581,560	716,771	411,575	117,105	92,835	2,919,846
1897-98.....	490,138	198,281	123,828	88,780	12,969	913,996

* Boxes.

not all that bad, for further on 212 are reported as 171 tight and 41 loose. Apples when loose lose from \$1 to \$1.75 in value; a lot of 12—8 Winesap and 4 York Imperial, loose—were sold for 15s. 3d. or \$3.80 per barrel; 43 Winesaps, loose, brought 14s. 9d. or \$3.68. Newtown Pippins bring the highest price, ranging from \$5 to \$9 per barrel.

The apples are mostly from Canada and New York, the varieties being principally Newtown Pippin, Baldwin, Greening, and [Northern] Spy; still I find in the list such familiar names as Ben Davis, Genet, and Winesap. On inquiry, I find the freight from Kansas City to New York is 63½ cents, and from New York across the water, seventy-five cents per barrel. A report of sales would read something like this: If, owing to superior skill in packing, they should reach their destination tight, the net proceeds would be \$3 or \$3.25. The Liverpool quotation on western Ben Davis, December 11, is \$4 to \$5 for tight; \$3.50 to \$4.38 for loose. I speak of one firm only; many others are in the same line.

During the week ending December 11, 1897, there were exported from the United States to Europe 25,447 barrels of apples; of these, Liverpool got 3335, London, 2580, Glasgow, 3567, Hamburg, 5264; equaling 14,756. The total export to Europe this year from the United States, up to December 11, is 586,906 barrels bringing this country over $1\frac{1}{2}$ million dollars. Last year we had a much larger crop, and up to this date had exported 2,087,573 barrels. Owing to the liability of getting loose in the barrel some shippers use boxes. We packed, last fall, 1000 boxes of Willow Twig and Ben Davis; these were packed in pear boxes, each apple wrapped in paper; the boxes (filled) would weigh about forty pounds. The apples are placed in layers six long by four wide and four layers deep, ninety-six apples to the box, putting the finest apples on top. The covers are put on with a lever press that presses on the ends of the boards and springs both the bottom and top of the box; the extra size in the middle is protected by cleats on the ends. The sides are of thicker boards and do not spring. If the apples should shrink in size, as apples do, the spring in the box will take up the slack. In loading on the car or ship, the boxes are placed on their edges. One thousand boxes make a good car-load, weighing about 40,000 pounds. A barrel will make about $4\frac{1}{2}$ boxes. These cases of selected apples are expected to sell readily for eight shillings (or \$2) per box, and packed in this careful manner should go through in perfect condition. If they bring satisfactory prices, I predict that next year more than one Kansas orchard will be packing apples for foreign export.

A SHORT ACCOUNT OF THE WELLHOUSE ORCHARDS.

In 1876 Mr. F. Wellhouse planted, at Glenwood, Leavenworth county, Kansas, 117 acres of apple trees, as follows: 60 acres of Ben Davis, 32 of Missouri Pippin, and 25 of Winesap. This orchard yielded, in 1880, 1594 bushels of apples, which sold for \$1.50 per barrel, or \$797; and in 1881 it yielded 3887 bushels, which sold for \$4 per barrel, or \$5184.

In 1878 he planted, near Gardner, Miami county, 160 acres, as follows: 80 acres of Ben Davis, 40 of Missouri Pippin, 30 of Winesap, and 8 of Cooper's Early and 8 of Maiden's Blush. These two orchards, of 277 acres combined, yielded, in 1882, 12,037 bushels, which sold for \$2.48 per barrel, or \$9,950.

In 1879 he planted, at Fairmount, Leavenworth county, 160 acres, as follows: 80 acres of Ben Davis, 40 of Jonathan, 30 of Winesap, and 8 of Cooper's Early and 8 of Maiden's Blush.

These three orchards, of 437 acres combined, yielded as follows:

	1883,	12,388	bushels,	sold at	\$3.00	per barrel.
	1884,	11,726	"	"	2.04	"
	1885,	15,373	"	"	2.00	"
	1886,	34,909	"	"	1.45	"
	1887,	33,790	"	"	2.11	"
	1888,	20,054	"	"	1.81	"
	1889,	11,952	"	"	2.49	"
	1890,	79,170	"	"	3.00	"
	1891,	63,698	"	"	1.75	"
	1892,	978	bushels.			
	1893,	900	"			
	1894,	47,374	"	sold at	\$2.50	per barrel.
ha	1895,	59,138	"			
ke	1896,	784	"			
Fr	1897,	3,758	"			
	1898,	3,639	"	not sold yet		

In 1889 he planted, near Wakarusa, Osage county, 800 acres, as follows: 300 acres of Ben Davis, 200 of Missouri Pippin, 160 of Jonathan, 75 of York Imperial, and 65 of Gano. In 1895 this orchard yielded 3470 bushels.

In 1894 he planted, near Tonganoxie, Leavenworth county, 300 acres, as follows: 100 acres of Ben Davis, 100 of Gano, 33 of Jonathan, 33 of York Imperial, and 34 of Missouri Pippin.

In 1895 he sold nearly 21,780 bushels, put in cold storage 9000 bushels, and sent to dryer 26,600 bushels, making a total for 1895 of 57,380 bushels.

In 1896 he set out, near Summit, Leavenworth county, 140 acres, making a total acreage of 620 acres of Ben Davis, 76 of Winesap, 409 of Missouri Pippin, 190 of Jonathan, 150 of York Imperial, 160 of Gano, 16 of Maiden's Blush, and 16 of Cooper's Early.

During this time he sold thousands of bushels of "culls" that are not counted in this statement, excepting in 1895. These culls sold, per bushel, as follows: 1883, at 30 cents; 1884, at 15 cents; 1885, at 20 cents; 1886, at 13 cents; 1887, at 7 cents; 1888, at 14 cents; 1889, at 18 cents; 1890, at 20 cents; 1891, at 15 cents; 1894, at 20 cents.

For profit, Mr. Wellhouse puts the Jonathan first, Ben Davis second, Missouri Pippin third, and Winesap fourth. He says Cooper's Early does not pay him.

REVISED LIST OF APPLES

Recommended for Kansas by the votes of the members of the State Horticultural Society, at its annual meeting, December, 1896:

List of Winter Varieties.

Ben Davis.....	44 votes.	Huntsman.....	2 votes.
Winesap.....	42 "	Mammoth Black Twig.....	2 "
Jonathan.....	41 "	Early Harvest.....	2 "
Missouri Pippin.....	40 "	Gilpin.....	1 "
Gano.....	30 "	Red Winter Pearmain.....	1 "
York Imperial.....	18 "	Salome.....	1 "
Genet.....	12 "	Rome Beauty.....	1 "
Smith's Cider.....	8 "	Ortley.....	1 "
Maiden's Blush.....	5 "	Wagener.....	1 "
Grimes's Golden.....	3 "	White Pippin.....	1 "
Willow Twig.....	3 "		

Summer and Fall Varieties.

Early Harvest.....	19 votes.	Red Astrachan.....	4 votes.
Red June.....	13 "	Golden Sweet.....	2 "
Maiden's Blush.....	12 "	Keswick Codlin.....	2 "
Chenango.....	6 "	American Summer Pearmain,	2 "
Yellow Transparent.....	5 "	Wealthy.....	2 "
Cooper's Early White.....	5 "	Orange Pippin.....	2 "
Duchess of Oldenburg.....	4 "	Summer Swaar.....	2 "

Fall.

Maiden's Blush.....	20 votes.	Cooper's Early White.....	3 votes.
Grimes Golden Pippin.....	13 "	Lowell.....	3 "
Rambo.....	10 "	Fameuse.....	3 "
Jonathan.....	10 "	Fall Wine.....	2 "
Pennsylvania Red Streak.....	3 "	Jefferis.....	2 "

Fall (continued).

Hay's Wine.....	1 vote.	Rome Beauty.....	1 vote.
Summer Rambo.....	1 "	Hubbardston's Nonsuch.....	1 "
Munster.....	1 "	Huntsman's Favorite.....	1 "
Fall Pippin.....	1 "	Sweet Russet.....	1 "
Northern Spy.....	1 "		

List for Family Orchard.

Jonathan.....	25 votes.	Gilpin.....	1 vote.
Winesap.....	24 "	Golden Sweet.....	1 "
Maiden's Blush.....	22 "	Fall Pippin.....	1 "
Early Harvest.....	21 "	Newtown Pippin.....	1 "
Red June.....	15 "	Sweet June.....	1 "
Missouri Pippin.....	13 "	Jersey Sweet.....	1 "
Grimes's Golden Pippin.....	13 "	Lansingburg.....	1 "
Ben Davis.....	12 "	Whitney No. 20.....	1 "
Rawle's Genet.....	12 "	Red Astrachan.....	1 "
York Imperial.....	11 "	White Winter Pearmain.....	1 "
Rambo.....	10 "	American Summer Pearmain..	1 "
Chenango Strawberry.....	8 "	Minkler.....	1 "
Cooper's Early White.....	8 "	Yellow Bellflower.....	1 "
Yellow Transparent.....	7 "	Dominie.....	1 "
Jefferis.....	6 "	Sweet Rambo.....	1 "
Huntsman's Favorite.....	5 "	Pennsylvania Red Streak.....	1 "
Smith's Cider.....	4 "	Stark.....	1 "
Wealthy.....	4 "	Lawver.....	1 "
Milam.....	3 "	Lowell.....	1 "
Rome Beauty.....	3 "	Fulton.....	1 "
Gano.....	3 "	Roman Stem.....	1 "
Red Winter Pearmain.....	2 "	Red Winter Sweet.....	1 "
Willow Twig.....	2 "	Primate.....	1 "
Fameuse.....	2 "	Klepsroth.....	1 "
Benoni.....	2 "	Garretson's Early.....	1 "
Fink.....	2 "	Red Betigheimer.....	1 "
Duchess of Oldenburg.....	2 "	Wagener.....	1 "

DESCRIPTION OF VARIETIES REFERRED TO IN THIS BOOK.

BEN DAVIS.

Synonyms: New York Pippin, Victoria Pippin, Victoria Red, Red Pippin, Kentucky Pippin, Baltimore Red, Baltimore Pippin, Baltimore Red Streak, Carolina Red Streak, and Funkhouser.

The origin of this apple is unknown. J. S. Downer, of Kentucky, writes that old trees are there found from which suckers are taken in way of propagating. The tree is very hardy, a free grower, with very dark reddish brown, slightly grayish young wood, forming an erect, round head, bearing early and abundantly. In quality it is not first rate, but from its early productiveness, habit of blooming late in the spring after late frosts, good size, fair, even fruit, keeping and carrying well, it is very popular in all the Southwest and West. Fruit medium to large. Form roundish, truncated conical, often sides unequal.

Color yellowish, almost entirely overspread, splashed and striped with two shades of red, and dotted sparsely with aureole dots. Stalk medium, rather slender. Cavity narrow, deep, russeted. Calyx partially open. Basin wide, abrupt, slightly corrugated. Flesh white, tender, moderately juicy, pleasant, subacid. Core medium to large. Good to very good. December to March.

Remarks on the Ben Davis by members of the State Horticultural Society:

E. J. Holman (Leavenworth county): I favor Ben Davis because of its large size and good appearance; because it is long-lived, and attractive in appearance in market; because it is an early bearer; and, to sum it all up, because it is profitable to grow.

J. W. Robison (Butler county): I favor Ben Davis because it is one of the most hardy, even, regular bearers; because it succeeds on a great variety of soils. It is handsome in appearance and attracts the eye in every market.

F. W. Dixon (Jackson county): I favor Ben Davis because it is the most profitable variety.

Phillip Lux (Shawnee county): It has a quality of sticking on until we are ready to pick. It gives good returns for our investment.

J. F. Maxey (Franklin county): I favor it because of its large size and attractive appearance.

G. L. Holsinger (Wyandotte county): I vote for it.

G. W. Bailey (Sumner county): The Ben Davis has been the most profitable with us. It is very attractive and popular, and a good seller.

A member: On account of its large size, attractive appearance, and good market qualities, I vote for it.

B. F. Smith (Douglas county): I vote for it because it is the best commercial apple we have and stands high in the European markets. It sells for six dollars a barrel in Hamburg.

WINESAP.

Synonyms: Winesap and Potpie Apple.

This is not only a good apple for the table, but it is also one of the very finest cider fruits, and its fruitfulness renders it a great favorite with orchardists. The tree grows rather irregularly, and does not form a handsome head, but it bears early, and the apples have the good quality of hanging late upon the trees without injury, while the tree thrives well on sandy, light soils. The tree is very hardy, and one of the most profitable orchard varieties wherever grown. Young wood reddish brown, with smooth red buds. Fruit of medium size, rather roundish oblong. Skin smooth, of a fine dark red, with a few streaks, and a little yellow ground appearing on the shady side. Stalk nearly an inch long, slender, set in an irregular cavity. Calyx small, placed in a regular basin, with fine plaits. Flesh yellow, firm, crisp, with a rich, high flavor. Very good. November to May.

Remarks on the Winesap by members of the State Horticultural Society:

C. C. Cook (Wabaunsee county): I strongly favor the Winesap, preferring it to any apple I grow.

J. W. Robison (Butler county): The Winesap is desirable because of its deep, rich color, its attractiveness, and high flavor. Its one principal defect is over bearing. It is a good seller.

E. J. Holman: The excellences of the Winesap consist in its color, its flavor, and its keeping quality. I would not recommend it for a commercial orchard. I recommend it for the family orchard only.

W. G. Gano (Missouri): That is my view. I would not recommend it as a

commercial apple. The tree grows straggling, and is subject to insects, and the winds affect them greatly, making them unprofitable in our orchards. As a family apple, when grown to perfection, we can hardly dispense with it.

F. W. Dixon: The Winesap trees on my farm are twenty-five years old, and last year yielded ten bushels of marketable apples [per tree], besides culls. I would not recommend the Winesap as a commercial apple, as it is usually small.

Phillip Lux: I must say a good word for the Winesap. It has many traits against it for profit; yet I would give it a place in the commercial orchard. It falls early, and must be picked early; but if planted in good, rich, black soil it will as a rule do well. It commands a good price, and is a good apple for variety. We cannot make it a leader, but should keep it among our commercial apples.

James Sharp (Morris county): I consider it a good apple for my soil. It is a good apple if planted in a cool and moist red clay. In this they grow to a marketable size.

G. L. Holsinger: I think I would not plant another Winesap, unless for family use. I would place it fifth or sixth on the list. After one or two good crops they generally play out. This year they were about the size of crab-apples.

J. W. Robison: The Winesap in Butler county is prone to spur blight. In summer, when the hot sun comes, they dry up in clusters. As far south as we are they are hardly profitable. Farther north they do better. In Illinois, from one square of 200 trees (Winesaps) I gathered 3000 bushels of apples, in 1871.

G. W. Bailely: I know no better apple for family use. In our country, in the low lands, they are fine, of fair size, producing well. While the tree is young the fruit is fine; after it gets older it overbears, and the fruit becomes small. I would not plant it for market.

William Cutter (Geary county): I consider the Winesap good for family orchards, but when old inclined to overbear, which enfeebles the tree. While the tree is young it is among the best. It does not pay for market.

B. F. Smith: I would drop it from the commercial list. If I were to plant 1000 trees I would plant only 200 Winesaps. I prefer the Ben Davis, but we should not all grow the same apple. We want variety.

William Cutter: Every one likes Winesaps, but we cannot grow them at ordinary prices.

George P. Whiteker (Shawnee county): I do not know a better apple. As remarked, when the tree gets old the fruit runs down in size. It is very deceiving. When it appears overloaded there are often not many on it.

President Wellhouse: It has disappointed us every year. Some years they are very full, but many go to the cull piles. I vote against the Winesap. We have not planted any for ten years. Mr. Walter Wellhouse is here. He can tell us about the Winesap.

Walter Wellhouse (Shawnee county): My experience is that, like some other apples, they will not grow in poor soils, but if the soil is suitable they are profitable.

Dr. G. Bohrer (Rice county): I have noticed it is not so much in the quality of the soil as the quantity of moisture in it. Having trees on high ground, I irrigated one of them, and it bore fine apples. In Arkansas, where the land is too poor to raise corn the Winesap does well; but it will not grow on high, dry soil. They must have more than the ordinary amount of moisture.

Secretary Barnes: T. W. Harrison, ex-mayor of Topeka, has Winesap apples growing about seven miles southwest of the city that are phenomenal. They are the largest I ever saw. They have been exhibited at our past meetings, and

people would hardly believe them Winesaps. He cannot account for it; says it must be some kind of freak. I examined the trees myself. They are well grown, on high, rolling prairie. I would recommend those who desire Winesaps to get scions from Mr. Harrison. He has seven or eight trees in his orchard, all in one row, far ahead of any Winesaps I ever saw.

Dr. G. Bohrer: Do you know whether there is a source of drainage to that point?

Secretary Barnes: I do not. The trees are probably eighteen years old, and on rolling land.

J. B. McAfee (Shawnee county): I have 145 Winesap trees in my orchard on high ground. They do reasonably well, but are not as large as Mr. Harrison's.

Phillip Lux: Mr. Harrison's orchard lies on a southern slope. It is good orchard land. The soil is very loose. His Missouri Pippins are as good in proportion as his Winesaps. His apples are all good.

J. F. Maxey: We have 300 or 400 acres in Winesap, Missouri Pippin, and Janet. I would not discard the Winesap.

JONATHAN.

Synonyms: King Philip and Philip Rick.

The Jonathan is a very beautiful dessert apple, and its great beauty, good flavor and productiveness in all soils unite to recommend it to orchard planters. The original tree of this variety is growing on the farm of Mr. Philip Rick, of Kingston, N. Y. It was first described by the late Judge Buel, and named by him in compliment to Jonathan Hasbrouck, Esq., of the same place, who made known the fruit to him. It succeeds wherever grown, and proves one of the best in quality, and most profitable either for table or market. The tree is hardy, moderately vigorous, forming an upright, spreading, round head. Young shoots rather slender, slightly pendulous, grayish brown. Fruit of medium size, regularly formed, roundish conical, or tapering to the eye. Skin thin and smooth, the ground clear light yellow, nearly covered by lively red stripes, and deepening into brilliant or dark red in the sun. Stalk three-fourths of an inch long, rather slender, inserted in a deep, regular cavity. Calyx set in a deep, rather broad basin. Flesh white, rarely a little pinkish, very tender and juicy, with a mild, sprightly, vinous flavor. This fruit evidently belongs to the Spitzenburg class. Best. November to March.

Remarks on the Jonathan by members of the State Horticultural Society:

Dr. G. Bohrer: Jonathan is probably the best apple I grow. They sell for the highest price in the general market. They produce fewer culls than other varieties. It is not a profuse bearer as far south as I am [Rice county]. It ripens too early, and is affected by strong winds.

E. J. Holman: The Jonathan is one of the most desirable all-around apples, excellent as a dessert fruit, of a beautiful deep, bright color, of good quality and strong constitution. It is often called a fall apple, yet, if put in cold storage, it may be brought out even in June in good condition. I place it third as a commercial fruit.

W. G. Gano: The Jonathan should be picked early and put in cold storage. I would place it second as a commercial apple.

W. J. Griffing (Riley county): We consider it about fourth on the list as a commercial apple.

J. B. McAfee: It is large, and about the second for profits in my orchard, which has been planted twenty-seven years.

F. W. Dixon: I would place the Jonathan about third as a commercial apple. In our county it is longer lived than any other apple tree and freer from insects.

James Sharp: Its only objection is its inclination to fall. I suppose, if picked early and put in cold storage, they may be as good, but do not look as well.

Walter Wellhouse: I think the demand for Jonathan is declining some among large dealers. A few years ago they sold for an advance of from fifty cents to one dollar per barrel. In Minneapolis and Chicago the market still seems good for them; but if I were to plant now I would not plant as many Jonathans as five or ten years ago.

G. P. Whiteker: The Jonathan sells better in our market [Topeka] than any other apple. They have a good reputation; none better. They must be picked early.

Phillip Lux: I would place it fifth commercially, it drops so early, before coloring up; it stands more abuse than any other apple we have, and, if gathered early, will keep even without cold storage until the market improves.

Dr. G. Bohrer: I agree with Mr. Sharp. I think the farther west we go the poorer the fruit gets. You have more rainfall in the eastern part of the state. It is hardy, possibly harder than Ben Davis, but it falls early. It is much like Winesap, requiring more moisture than other varieties. When not much exposed to winds it does well. Of late our rainfall is not sufficient, and they are not doing so well, but since trying irrigation they do better.

William Cutter: I live too far west for the Jonathan. It will not stand drought or wind. It ripens too early. It is a cold-storage apple. The worst spur blight I ever saw was on them.

B. F. Smith: It is a good wet-weather apple. If there is plenty of moisture, they do fine. I gather them about the 10th of September, and they keep until the next spring. I tried to see how long I could keep them. They should be about third on the commercial list.

MISSOURI PIPPIN.

Synonym: Missouri Keeper.

It is said to have originated in the orchard of Brink Hornsby, Johnson county, Missouri. Tree hardy, a strong, upright, rather spreading grower, an early and abundant annual bearer. Fruit medium to large, roundish oblate, slightly oblique, somewhat flattened at the ends; skin pale, whitish yellow, shaded, striped and splashed with light and dark red, often quite dark in the sun, having many large and small light and gray dots; stalk short, small; cavity large, deep; calyx closed, or half open; basin rather abrupt, deep, slightly corrugated; flesh whitish, a little coarse, crisp or breaking, moderately juicy, subacid; good; core small. January to April.

Remarks on the Missouri Pippin by members of the State Horticultural Society:

C. C. Cook: I am a warm friend of the Missouri Pippin, and vote it second. It is a short-lived tree, but brings paying returns for expense and trouble. It has a fairly good flavor.

J. W. Robison: The Missouri Pippin is a young and profuse bearer, and quite hardy with me. I should place it second on the list.

E. J. Holman: I have eliminated it from my family orchard, and give it only standing-room as a commercial fruit, and there rate it second [in quality]. There can be more money made from it in a few years than from any apple we have. It is the youngest bearing tree we have. It grows to a good size, and by some is preferred to Ben Davis. The great merit of this apple is in its youthful productiveness; good color, and marketable quality.

W. G. Gano: I do not approve of planting it thickly, intending to let it remain. It is apt to overbear, break in pieces, and become almost worthless. With proper care and thinning when too thick we can partially overcome this.

W. J. Griffing: It is my second-best apple. I consider the Winesap the best, as it has paid me the best, and I am planting for winter profit only these two. All apple trees die young with us.

F. W. Dixon: I can add nothing new, but place it second on the list.

James Sharp: It has been my most profitable variety. About four-fifths have been marketable. As to dying young, I would rather grow new ones.

President Wellhouse: We will have to stick to it awhile yet in Kansas. When of good size they command a price in advance of the Ben Davis.

G. P. Whiteker: It gives good satisfaction as a commercial apple. It bears young; and you can get good returns for eight or ten years, and then put out a new orchard.

Phillip Lux: I would place the Missouri Pippin second on the commercial list.

William Cutter: It is the youngest to bear. It is a Western apple. Other varieties gradually die out, but it sticks. The farther west you go the better it is. It stands drought and wind best of all. While it breaks off on the top, it is not a short-lived tree.

B. F. Smith: I would place it second on the commercial list.

GANO.

Origin, Howard county, Missouri. Tree very hardy; has never been injured by the cold winters; bears very young, roots readily from its own stock, and can almost be grown from a cutting. Fruit bright red on yellow ground, no stripes; large, oblong, tapering to the eye; surface smooth, takes a very high polish, making it valuable as a stand fruit, thought by many to surpass the Ben Davis. Minute dots; basin shallow, sometimes deep; stem medium to long; flesh white, fine grained, tender, mild, pleasant subacid. An early, annual and prolific bearer. December to May.

Remarks on the Gano by members of the State Horticultural Society:

W. G. Gano: I cannot be against my namesake. I have found nothing yet that excels the parent trees. The Gano is creating a sensation, more especially in the southern part of Missouri. They prefer it to Ben Davis, and, where extensively planted and in bearing, it is creating a sensation. While I have no interest in it, other than the name, still I think we have in the Gano something that will stay. It is much like Ben Davis.

E. J. Holman: I would class it and the Ben Davis as twins.

James Sharp: I planted about 700 trees of it five years ago. This year I raised five apples. Two of these could not be told from Ben Davis. One looked like Jonathan.

William Cutter: I class it with Ben Davis. It differs little except in color. Trees are alike, but I think it a younger bearer. I got my grafts from Lee's Summit, Mo., paying five dollars per 100 for them. One tree I gave to a friend was this year a wonder to all who saw it.

President Wellhouse: We have seventy or eighty acres in Gano, planted five or six years ago. While the tree is much like Ben Davis, I can distinguish a difference in the apples. If I pile both kinds together I can see a difference; if I pick out a Gano and put it in the Ben Davis pile, neither I nor any other man on earth can tell it from the Ben Davis. I do not know whether it is distinct

from the Ben Davis or not. If it is Ben Davis, it is all right. I hope it is distinct, but have so far been unable to settle the question.

W. G. Gano: We originally found only one tree in an orchard in Pratt county, Missouri, and in the same orchard there were plenty of Ben Davis trees. There may have been a mix-up of these varieties, but you will not be disappointed if you get the Gano.

President Wellhouse: Before planting, I went to Lee's Summit for three or four years in succession and examined the original trees, to see whether we ought to plant any; we concluded to plant, for if they were not a new apple they would be the Ben Davis anyhow. We may have obtained Ben Davis trees.

Mrs. A. Z. Moore: My husband handles many of them on commission, and favors them both in the orchard and in the market. He says they are known as Jonathan, not as Gano, and while you may not distinguish them in a pile of Ben Davis, you will know the difference if you put your teeth into them.

YORK IMPERIAL.

Synonym: Johnson's Fine Winter.

Origin thought to be York county, Pennsylvania. Tree moderately vigorous, productive. Young wood rich brown, downy. Fruit medium, oblate oblique, whitish, shaded with crimson in the sun, thinly sprinkled with light and gray dots. Stalk short. Calyx closed, or partially open. Basin large, deep. Flesh yellowish, firm, crisp, juicy, pleasant, mild subacid. Good to very good. Core compact, small. November to February.

Remarks on the York Imperial by members of the State Horticultural Society:

C. C. Cook: I have planted heavily of York Imperial. They are not yet in full bearing. They have given me good results. The trees are of large size and the growth indicates that they will be strong bearers. They are of rather a twig growth. I would put them about sixth on the commercial list.

E. J. Holman: The York Imperial is an old apple. It is new to many of us because of its late sudden popularity. It has been sent to Europe, holding its own with Missouri Pippin and others. It is large, a good keeper, and growers always seem pleased with it. It seems to be growing popular.

James Sharp: I have about 500 or 600 trees I planted on the recommendation of President Wellhouse, six years ago. This year they produced about 100 bushels. I think they will be profitable.

President Wellhouse: I saw a gentleman from St. Louis who gathered about ten car-loads, and he was favorably impressed with it. We have many trees bearing. It keeps well in cellars.

Phillip Lux: I would place them third on the commercial list.

William Cutter: Mine are just beginning to bear. It is not a youthful bearer. I think it will be a popular apple.

G. L. Holsinger: They commence to bear young. We have some that are twenty-two years old. This year they were full. Like the Jonathan, they mature too early and fall off. What I put in the cellar this year kept well, very few rotting.

RAWLE'S JANET.

Synonyms: Missouri Janet, Red Neverfail, Rawle's Jannet, Rawle's Jannetting, Rawle's Genet, Rock Remain, Rock Rimmon, Yellow Janett, Winter Jannetting, Jeniton, Jennett, Neverfail, Indiana Jannetting, and Raul's Gennetting.

Originated in Amherst county, Virginia, on the farm of Caleb Rawle. Tree hardy, vigorous, spreading. It puts forth its leaves and blossoms much later

than other varieties in the spring, and consequently avoids injury by late frost; it is, therefore, particularly valuable for the South and Southwest, where it is much cultivated. Young wood clear reddish brown; fruit rather large, oblate conic, yellowish, shaded with red and striped with crimson; stalk short and thick, inserted in a broad, open cavity; calyx partially open, set in a rather shallow basin; flesh whitish yellow, tender, juicy, pleasant subacid; good to very good; February to June.

Remarks on the Rawle's Janet by members of the State Horticultural Society:

C. C. Cook: I have been acquainted with the Janet from boyhood, but I have little, if any, use for them, because they overbear. It is a hard tree for me to do anything with; cannot get them into shape—die quick.

E. J. Holman: I would only recommend a tree or two of them for the family orchard. It has had its day in the West, and is succeeded by more profitable varieties.

H. L. Ferris (Osage county): I would not plant them to sell. They are too subject to diseases—bitter rot, etc.

W. G. Gano: I think it could be discarded altogether.

James Sharp: Will not pay for commercial orchard.

G. P. Whiteker: Janets bring a good price. They are late keepers. We kept ours this year until we began to pick apples the following fall. It is not a good commercial apple.

Phillip Lux: I would place it on the retired list.

William Cutter: Only fit for family use. Trees overbear; fruit small.

B. F. Smith: I would place it on the retired list.

SMITH'S CIDER.

Synonyms: Smith's, Fuller, Pennsylvania Cider, Popular Bluff, and Fowler. Origin, Bucks county, Pennsylvania. This apple is widely grown and much esteemed as a profitable market sort. The tree is a very vigorous, straggling, spreading grower, and productive. Young wood a rich, dark brown. Fruit medium to large, roundish oblate conic, yellow, shaded and striped with red, sparsely covered with gray dots. Stalk slender, of medium length, inserted in a deep, rather narrow cavity. Calyx closed, set in a broad, rather shallow basin. Flesh whitish, tender, juicy, crisp, pleasant, mild subacid. Good December to March.

Remarks on the Smith's Cider by members of the State Horticultural Society:

C. C. Cook: I planted Smith's Cider pretty heavily, and now regret it. It blights badly, and the apples fall off. I intend to replace it with York Imperial.

E. J. Holman: It deserves a place in the family orchard, and a small place in the commercial orchard. They are as large as Ben Davis, and as great bearers, but they fall from the tree sooner.

James Sharp: We had 500 Smith's Cider. Nearly all blighted and died; have never paid me.

G. Whiteker: It is a splendid apple, but blights; I think it will not be profitable.

B. F. Smith: We should not drop it from the list; it is a fairly good apple.

MAIDEN'S BLUSH.

A remarkably beautiful apple, a native of New Jersey, and first described by Cox. It begins to ripen about the 20th of August, and continues until the last of October. It has all the beauty of color of the pretty little Lady Apple, and is much cultivated and admired, both for the table and for cooking. It is also very

highly esteemed for drying. This variety forms a handsome, rapid-growing tree, with a fine spreading head, and bears large crops. It is very valuable as a profitable market sort. Fruit of medium size, very regularly shaped, and a little narrow towards the eye. Skin smooth, with a delicate waxen appearance, pale lemon yellow in the shade, with a brilliant crimson cheek next the sun, the two colors often joining in brilliant red. Stalk short, planted in a rather wide, deep hollow. Basin moderately depressed. Calyx closed. Flesh white, tender, sprightly, pleasant subacid. Good.

Remarks on the Maiden's Blush by the members of the State Horticultural Society:

C. C. Cook: It is all right to raise for a local market and for family use. Hardy tree. I planted probably 100. I cannot determine where to place it on the list. Probably others have had more experience with it than I have.

E. J. Holman: The Maiden's Blush deserves a place in both the family and the commercial orchard. In its season it is unexcelled for market purposes, and is especially attractive. I should recommend it as a commercial apple.

H. L. Ferris: I would place it first as a summer apple for local market.

W. G. Gano: You certainly will not discard it.

W. J. Griffing: It is about the earliest apple that will bear shipping in summer, and very profitable.

F. W. Dixon: I find it rather a shy bearer, but the tree is long-lived and very hardy, and it deserves a place in the family orchard. I think there is no profit in them for a commercial orchard.

President Wellhouse: They are long-lived and very hardy; I would recommend them for family, but not for commercial orchard.

G. P. Whiteker: It comes at a time when there is much other fruit. I do not think it pays very well. Mine turn brown from some cause.

Phillip Lux: It is our very best apple in its season; while talking of the commercial orchard, there is a demand for apples at all seasons of the year, and if we discard this, we will have nothing at its season. I would say, place it in the commercial orchard for export.

W. J. Griffing: Do not know that it is profitable, but for quality the Maiden's Blush is worthy of a place among fruits.

G. W. Bailey: As a summer apple for family and commercial orchards, I would place it at the head of the list.

William Cutter: It is the best apple of its season for all purposes.

B. F. Smith: It is the best commercial apple for summer trade we have.

Secretary Barnes: At the late meeting of the Missouri Horticultural Society, the secretary stated that he thought there was good money in the Maiden's Blush. He said the trouble was, they were raised in too limited quantities. He said they should be raised in car lots for shipping to Northern cities; that they were quick growers and brought ready money, and at their season had little competition in the market. They come in when there are few apples obtainable, and he considers them profitable.

H. L. Ferris: In my experience it bears only every other year. Is that the experience of others?

President Wellhouse: The Maiden's Blush is the only summer apple that we have made pay.

J. W. Robison: We have not grown Maiden's Blush very largely here. It is one of our old apples in Illinois, and it is the earliest, most regular and profuse bearer, and the best keeper of its season to ship in hot weather. It was named

for its beauty, and is the most attractive apple grown. They last well if kept moderately cool. They are shipped largely in barrels, the earlier ones in boxes, from central Illinois north. The tree is tender in unusually cold seasons. Farther south there is no danger. I find it is a good apple to sell in a small way to grocerymen.

GRIMES'S GOLDEN PIPPIN.

Synonym: Grimes's Golden.

This valuable apple originated many years since on the farm of Thomas Grimes, Brooke county, Virginia. In its native locality it is highly prized for the peculiar hardihood of the tree, withstanding uninjured the most severe winters, and never breaking in its limbs; also, for its uniform regular annual productiveness. Tree vigorous, hardy, upright, spreading, very productive; branches with peculiar knobs at the base of each, connecting it with the main limbs. Young wood dark, dull red brown, grayish. Fruit medium, roundish oblate, slightly conical. Skin uneven. Color rich golden yellow, sprinkled moderately with small gray and light dots. Stalk rather short and slender. Cavity rather deep, sometimes slightly russeted. Calyx closed, or partially open. Basin abrupt, uneven. Flesh yellow, compact, crisp, tender, juicy, rich, sprightly, spicy subacid; peculiar aroma. Core rather small. Very good to best. December to March.

Remarks on the Grimes's Golden Pippin by members of the State Horticultural Society:

C. C. Cook: I have not tried to ship any Grimes's Golden. I would place it about second on the list of summer [?] apples. With me it is a good, thrifty, hardy tree, but my orchard is young.

J. W. Robison: I have grown it extensively. It is one of the best fall apples and one of the beauties. It does not keep well. It rots badly after it is gathered and goes to market in rather bad shape. It is not planted as much now as in the past.

E. J. Holman: It stands in quality beside the Jonathan, and is a first-class dessert apple. It is a good bearer and ought to be in every family orchard, but I would not recommend it for the commercial orchard.

H. L. Ferris: Mine bore very heavily and were large and fine. Sold well locally: never shipped any; think they should come next to the Maiden's Blush in the commercial orchard.

W. G. Gano: The Grimes's Golden is the very best apple of its season. Should be in all family orchards, and have a small place in commercial orchards.

J. B. McAfee: Like Mr. Gano, I consider it the very best apple that grows, and one of the most profitable in my orchard. I find it short-lived. I take best care of them for use of my family until about the 1st of November.

F. W. Dixon: It is the best apple for family use, but drops badly. The tree is a good bearer but not long-lived.

G. P. Whiteker: I plant Grimes's Golden and Maiden's Blush for profit. The Grimes's Golden is handsome and brings a good price, especially at this time of the year—December.

Phillip Lux: I have had experience with it for years. In the family orchard we cannot do without it. We aim to keep it for our family as long as it lasts, say until February. In my opinion it is better than any pear that grows in our state. We should handle them with care, as we do pears. Put away carefully, in a cold, dry cellar, they retain their flavor and keep well. I think them worthy of a place in the commercial orchard.

J. F. Maxey: I like to eat them; most of us do. There is a place for them as a fancy apple.

William Cutter: I consider it the best-flavored apple grown for family use. Missouri and Arkansas have brought the big red apple into history, but now the big yellow apple is preferred by many consumers. I consider them extra fine.

B. F. Smith: I pack mine in boxes as well as barrels. I consider them fine.

G. Y. Johnson (Douglas county): I find the tree is not as hardy as I would like to have it. As far as the apple is concerned, it sells as well as any.

HUNTSMAN'S FAVORITE.

A seedling on the farm of John Huntsman, of Fayette, Mo. Tree vigorous, not a very early bearer, but is very productive annually when the tree has attained sufficient age; it is said to be a valuable and profitable fruit in the locality where it originated. Young shoots smooth, reddish brown; fruit large, oblate, slightly conic, often a little oblate; skin smooth, pale yellow, sometimes a shade of pale red or deep yellow in the sun, and a few scattering grayish dots; stalk short, small; cavity broad, deep, sometimes slight russet; calyx closed, or nearly so; basin large, deep, slightly corrugated; flesh pale yellow, a little coarse, crisp, tender, juicy, mild, rich subacid, slightly aromatic; very good; core rather small. December to March.

Remarks on the Huntsman's Favorite by members of the State Horticultural Society:

William Cutter: The Huntsman is long-lived and deserves a place in our list.

E. J. Holman: The Huntsman is of the York Imperial order, an old variety, not sufficiently known. In Kansas City, I saw them on sale at six dollars per barrel. The tree is a good bearer, and will be planted more than it has been; it never blights.

B. F. Smith: I agree with Mr. Holman.

W. G. Gano: It is a very desirable orchard tree; it is just wonderful how our old orchards hold out; its quality and size are good. It has one fault: if put in cold storage it bleaches out, as most yellow apples do. I cannot keep yellow apples in cold storage, and the Huntsman has disappointed me; but if taken out and sold when just right it is a success, and sells in Kansas City at six dollars per barrel.

MAMMOTH BLACK TWIG.

This apple originated with John Crawford, near Ray's Mills, Washington county, Arkansas. It is conceded to be a seedling of the Black Twig (said to be a misnomer for the Winesap). It has been exhibited as the "Arkansaw." Mr. Crawford says he brought to Arkansas and planted seeds of the Limber Twig and Black Twig over fifty-five years ago, and this apple sprang from one of those seeds. Really an enlarged and improved Winesap. Tree a fine, upright, spreading grower.

Remarks on the Mammoth Black Twig by members of the State Horticultural Society:

William Cutter: My trees set fruit for three years, but it all dropped off.

President Wellhouse: Mr. Munger says his were very small this year, but also that all his apples were small.

G. W. Bailey: I have a few, planted eight years, but the fruit this year was very small.

E. J. Holman: Many Mammoth Black Twig trees have been extensively propagated by nurserymen. We should know more about them. This variety came

before the public with a "hurrah," and people were told it was an apple with the quality of Winesap and the vigor of Ben Davis.

Mrs. A. Z. Moore (Missouri): My husband and I superintended sixty acres. We grew 500 bushels of them, all very fine. Of the tree I know little, but the apples were beautiful. They are of dark color and very handsome.

B. F. Smith: Two years ago I was down the Port Arthur road, and saw some, and they were fine-looking apples; but on testing it I thought many others were better, though in the general trade I think it will do well. We have a few trees and they are rapid growers, but I would not recommend them for flavor.

Mr. Adams: I can give you no particular information on this apple, but believe in the right location it is as fine as any grown. Location has much to do with its success.

Walter Wellhouse: I examined some Mammoth Black Twigs in Leavenworth, and they were of good size—as large as any Winesap I ever saw, and of good color.

L. D. Buck: It is a hardy grower. This year it is small.

PECK'S PLEASANT.

Synonym: Waltz Apple.

A first-rate fruit in all respects, belonging to the Newtown Pippin class. It has long been cultivated in Rhode Island (where, we think, it originated) and in the northern part of Connecticut, and deserves extensive dissemination. It considerably resembles the Yellow Newtown Pippin, with more tender flesh, and is scarcely inferior to it in flavor. The tree is a moderate, upright, spreading grower, but bears regularly and well, and the fruit commands a high price in the market. The apples on the lower branches of old trees are flat, while those on the upper branches are nearly conical. Young shoots reddish brown, slightly downy. Fruit above medium size, roundish, a little ribbed, and slightly flattened, with an indistinct furrow on one side. Skin smooth, and, when first gathered, green, with a little dark red; but when ripe a beautiful clear yellow, with bright blush on the sunny side and near the stalk, marked with scattered gray dots. The stalk is peculiarly fleshy and flattened, short, and sunk in a wide, rather wavy cavity. Calyx woolly, sunk in a narrow, abruptly and pretty deeply sunk basin. Flesh yellowish, fine grained, juicy, crisp and tender, with a delicious, high aromatic, sprightly subacid. Very good or best. November to March.

Remarks on Peck's Pleasant by members of the State Horticultural Society:

H. L. Ferris: We have a large number; while generally small, they can be made larger by cultivation and care. They are the longest keepers I know of, and carry well in shipping.

William Cutter: I was well acquainted with it in Illinois.

Secretary Barnes: About a year and a half ago, Governor Morrill said to me, "Why do n't you get your people to grow Peck's Pleasant? It is the best apple grown."

E. J. Holman: I have several trees, planted in 1870. They have been light bearers. The apple is of high quality, and keeps until January. The color is not so good as Huntsman. They die early.

H. L. Ferris: I cannot agree to that. I never had one die.

C. C. Cook: It is a good apple for home use; not very profitable.

W. G. Gano: Good family apple; green; subacid; elegant in quality.

INGRAM.

A new variety, grown from seed of Rawle's Janet, by Martin Ingram, of Greene county, Missouri. Tree productive, and the fruit especially valued for

its long keeping. Fruit medium, or below, roundish oblate, orange yellow, mostly overspread with broken stripes of rich, warm red, gray russet dots, and slight marblings. Stalk slender. Calyx small. Flesh yellowish white, moderately juicy, crisp, mild subacid. Core above medium. Seeds dark brown. February to June. (Hort.)

Remarks on the Ingram by members of the State Horticultural Society:

Mrs. A. Z. Moore: I speak of this as the "coming apple" in southern Missouri. They are not very large; beautiful in color; have a tendency to overbear and grow in clusters. Must be picked by hand; is free from common diseases.

J. F. Maxey: I am greatly interested in it. Very late last spring, while in Kansas City, I noticed a variety of apples that looked so fresh, with stems as green as if just picked, in shape and color like large Janets. They had come out of cold storage. I asked the name, and was told they were Ingram. I was told they were grown in the vicinity of Garden City, Kan. I wrote to Garden City, and received an answer from the grower, saying this apple was well worthy of growing.

Mrs. A. Z. Moore: I have seen it kept until the following August.

G. P. Whiteker: I got twenty barrels of them from Mr. Rose in Kansas City. I brought them here [Topeka] and retailed most of them, and got six dollars per barrel for them. I do not think we found two bad apples to the barrel. Most people thought them Janets. I believe it a profitable tree to plant.

B. F. Smith: In collecting apples in Douglas county for the World's Fair, we could not tell them from the Janet, except in size. It is beautifully streaked, and the grower called it a variety of the Janet.

LOWELL.

Synonyms: Queen Anne, Tallow Apple, Michigan Golden, Golden Pippin of some, Greasy Pippin, and Orange.

Origin unknown. Tree hardy, vigorous, spreading, productive. Young wood reddish brown. Fruit large, roundish, oval or conic, bright waxen yellow, oily. Stalk of medium length. Cavity deep, uneven. Basin deep, abrupt, and furrowed. Calyx closed. Flesh yellowish white, with a brisk, rich, rather acid flavor. Good to very good. September, October.

Remarks on the Lowell by members of the State Horticultural Society:

J. B. McAfee: I have realized more from my Lowells than from any other apple in my orchard. They are early and prolific. The Lowell has been the best-paying and the easiest-selling apple in our market [Topeka].

Phillip Lux: I planted mine in 1870. They blight badly and the fruit is often knotty. Have made no money from them.

J. W. Robison: I grew it in Illinois. I planted it here in 1879 and 1880, and it paid there and here. It is a large, green, smooth apple, and follows the Maiden's Blush closely. The tree did not blight with me there or here. It is best cooked. It does not get mellow or soft. It is an old variety and is falling out.

E. J. Holman: This apple is all right in such a market as Topeka in its season. It is not good to ship. Another apple we know little of is the Orange Pippin. There is two or three dollars in it where there is one dollar in the Maiden's Blush. It can be shipped to Liverpool and back in good condition. No other will compare with it in productiveness. It ought to be on our list.

CELESTIA.

Originated with L. S. Mote, Miami county, Ohio. A new variety, of good promise as an amateur sort. Fruit large, form roundish, conical, slightly ribbed.

Color pale yellow, moderately sprinkled with gray or brown dots, and sometimes large dots of red. Stalk rather short and slender. Cavity deep, uneven. Calyx closed. Segments long, slender, partially recurved. Basin rather small, furrowed. Flesh yellowish, crisp, tender, juicy, very pleasant, rich, mild subacid. Core rather large. Very good. October.

MINKLER.

Synonym: Brandywine.

This is an old variety which was first exhibited before the Illinois Horticultural Society, and, because it could not be identified, received, for the time being, the name of its exhibitor. At some future time it will probably be found identical with some variety long since named and described. Tree an irregular grower; good bearer and keeper. Fruit medium, roundish oblate, slightly conic, pale greenish yellow, striped and splashed with two shades of red. Flesh yellowish, compact, moderately juicy, mild, pleasant subacid. Good. Core small. January to March.

KING OF TOMPKINS COUNTY.

Synonyms: King, Tom's Red, Tommy Red.

Origin uncertain; said to have originated with Thomas Thacher, Warren county, New Jersey. A valuable market apple. Tree very vigorous, spreading, abundant bearer annually. Young shoots very dark reddish brown, quite downy, especially toward the ends. Fruit large, globular, inclining to conic, sometimes oblate, angular. Color yellowish, mostly shaded with red, striped and splashed with crimson. Stalk rather stout and short, inserted in a large, somewhat irregular cavity. Calyx small and closed, set in a medium, slightly corrugated basin. Flesh yellowish, rather coarse, juicy, tender, with an exceedingly agreeable, rich, vinous flavor, delightfully aromatic. Very good to best. December to March.

SUMMER QUEEN.

Synonyms: Sharpe's Early, Lancaster Queen, and Polecat.

This variety forms a large tree with somewhat pendent boughs, and is a profitable sort for orchards and marketing over a large territory. The fruit is large and broad at the crown, tapering toward the eye. The stalk is rather long, and is planted in a pretty deep cavity, sometimes partially closed. Calyx but little sunk, in a narrow plaited basin. Skin fine deep yellow in its ground, though well striped and clouded with red. Flesh aromatic, yellow, rich, and of good flavor. August and September.

LAWVER.

Origin uncertain. Introduced by George S. Parks, of Parkville, Mo., and said to have been found in an old Indian orchard in Kansas. Tree vigorous, spreading, an early and annual bearer; a beautiful fruit and a long keeper. Fruit large, roundish oblate. Color dark, bright red, covered with small dots. Stalk medium. Cavity deep, regular. Calyx small, closed. Basin medium, furrowed. Flesh white, firm, crisp, sprightly, aromatic, mild subacid. January to May. (*Prairie Farmer.*)

STARK.

Origin unknown; grown in some parts of Ohio, and valued as a long keeper and profitable market fruit. Tree vigorous, upright, spreading. Young shoots dark brownish red. Fruit large, roundish, inclining to conic, sometimes a little elongated, and sometimes slightly oblique. Skin greenish yellow, shaded, splashed and striped with light and dark red over nearly the whole surface, and thickly sprinkled with light and brown dots, a portion of them aureole dots. Stalk short, rather stout, inserted in a medium cavity. Calyx closed. Basin

rather large, slightly corrugated. Flesh yellowish, a little coarse, moderately juicy, mild subacid. Good. Core small. January to May.

WHITE WINTER PEARMAIN.

Synonym:—Campbellite.

Origin unknown; by some thought to be an old Eastern variety; highly esteemed at the West. Tree spreading, hardy, and thrifty, a regular and good bearer. Young shoots very short jointed, dull reddish brown, slightly grayish or downy at the ends. Fruit medium or above, roundish oblong conic, somewhat oblique. Stalk short, in a deep cavity. Calyx nearly closed. Segments long. Basin uneven. Skin pale yellow, with a slight blush or warm cheek, thickly sprinkled with minute brown dots. Flesh yellowish, tender, crisp, juicy, very pleasant subacid. Very good. January to April.

SMOKEHOUSE.

Synonyms: Millcreek Vandevere, Red Vandevere, English Vandevere.

Origin, Lancaster county, Pennsylvania, near Millcreek, grown on the farm of — Gibbons, near his smokehouse; hence its name. An old variety, and popular in Pennsylvania. It somewhat resembles the old Pennsylvania Vandevere, and is supposed to be a seedling of it. Tree moderately vigorous, with a spreading head, a good bearer. Young wood dark, dull reddish brown. Fruit rather above medium, roundish oblate, skin yellow, shaded and splashed with crimson, and thickly sprinkled with large gray and brown dots. Stalk rather long, curved, inserted in a broad cavity. Calyx closed, set in a wide basin of moderate depth, slightly corrugated. Flesh yellowish, somewhat firm, juicy, crisp, rather rich subacid. Good. September to February. Valued for culinary uses.

AUTUMN PEARMAIN.

Synonym:—Winter Pearmain.

A slow-growing tree, but attains a large size. Branches slender, spreading. Fruit of medium size, roundish, narrowing gradually toward the eye. Color brownish yellow, mixed with green on the shaded side, but next the sun reddish, blended with yellow, streaked with deeper red, and sprinkled with numerous small brown specks. Stalk short, obliquely planted under a fleshy lip. Calyx small, set in a broad shallow basin, which is sometimes scarcely at all sunk, and obscurely plaited. Flesh pale yellow, crisp, firm, a little dry, but rich and high flavored. Core rather small. Quality very good. October to March.

CHENANGO (STRAWBERRY).

Synonyms: Frank, Buckley, Sherwood's Favorite, Strawberry, Jackson Apple, and Smyrna.

Originated in the town of Lebanon, Madison county, New York. It is an apple pleasant to the taste and much esteemed as a table fruit wherever grown. Tree is vigorous, spreading. Young wood light reddish brown, downy. Fruit medium, oblong conic or oblong truncated conic, indistinctly ribbed. Color whitish, shaded, splashed and mottled with light and dark crimson over most of the surface; light dots. Stalk rather short, small. Cavity acute, somewhat uneven. Calyx closed, or partially open. Segments erect. Basin rather large, abrupt, slightly corrugated. Flesh white, tender, juicy, peculiar mild subacid. Core rather large. Very good. September and October.

HAAS.

Synonyms: Horse Apple, Summer Horse, Yellow Hoss, and Trippe's Horse. Origin supposed to be North Carolina. Tree vigorous, an annual, early and

abundant bearer, valuable for drying and culinary purposes. Young wood light reddish brown. Fruit large, roundish, yellow, sometimes tinged with red, and small patches of russet. Flesh yellow, rather firm and coarse, tender, pleasant subacid. Good. Last of July and first of August.

HAAS.

Synonym: Ludwig.

Originated on the land of — Ludwig, Bucks county, Pennsylvania, and considerably grown in its native locality. Fruit large, roundish, slightly conical, whitish, splashed, mottled and shaded with light red; many dots, with dark centers. Stalk short, slender. Cavity rather large, a little greenish russet. Calyx closed. Basin slightly corrugated. Flesh white, sometimes a little stained next the skin, fine grained, juicy, mild subacid. Core rather small. Good to very good. November to March.

BAILEY'S SWEET.

Synonyms: Edgerly's Sweet, Howard's Sweet, and Patterson's Sweet.

Origin unknown; introduced by J. Edgerly, of Perry, Wyoming county, New York. Tree hardy, vigorous, upright, spreading, productive. This variety is regarded as profitable for all purposes, although perhaps a little too tender skin for shipping long distances. Fruit large, form roundish conical often approaching oblong, obscurely ribbed; color yellowish, mostly shaded and obscurely striped with red, and thickly sprinkled with minute dots. Stalk short and rather small, inserted in a narrow cavity. Calyx small, closed, set in a narrow, irregular basin. Flesh white, tender, not very juicy, almost melting, with a honeyed sweet flavor. Core rather large. Very good. November to March.

SWEET JUNE.

Synonyms: Summer Sweet and Hightop Sweet.

Origin, Plymouth, Mass. An old variety, highly prized at the West. Growth upright, vigorous. Tree hardy, very productive, light reddish brown shoots. Fruit medium or below, roundish, regular. Skin very smooth. Color light yellow, partially covered with green dots. Stalk medium, inserted in a deep, narrow cavity, surrounded by thin russet. Calyx small, closed. Basin shallow, slightly furrowed. Flesh yellowish, very sweet, not very juicy, but pleasant and rich. Very good. August.

WEALTHY.

Originated by Peter M. Gideon, near St. Paul, Minn., from seed gathered in Maine about 1860. So far the tree has proved hardy, vigorous, and healthy. Fruit medium, oblate or roundish oblate; whitish yellow ground, shaded with deep, rich crimson in the sun, obscure broken stripes and mottlings in the shade, sometimes entirely covered with crimson, many light dots. Stalk short to medium, slender. Cavity green, russet. Calyx partially closed. Basin deep, abrupt, uneven. Flesh white, fine grained, stained with red, tender, juicy, lively, vinous subacid. Very good. Core small. Season, December to February.

RED JUNE.

Synonyms: Knight's Red June, Blush June, Georgia June, and Wilson's June.

Origin somewhat uncertain, supposed to be Carolina. Tree very vigorous, upright, an early and abundant bearer, much esteemed at the South and Southwest as their best early apple; ripe a few days after Early Harvest; not equal to it in flavor, but more profitable as an orchard fruit. Fruit medium or below, oval, irregular, inclined to conic. Skin smooth, nearly the whole surface shaded

with deep red, and almost of a purplish hue on the sunny side, and covered with a light bloom. Stalk variable in length, inserted in a small, narrow cavity. Calyx closed. Segments long, reflexed. Basin narrow, plaited. Flesh very white, tender, juicy, with a brisk subacid flavor. Core rather large. Very good.

NOTE.—Carolina Striped June (Carolina June). This is generally confounded with the above, and is scarcely distinguishable, except that, as it ripens, it becomes striped. One is doubtless a seedling from the other.

BALDWIN.

Synonyms: Woodpecker, Pecker, Steel's Red Winter, Red Baldwin, and Butters.

The Baldwin stands at the head of all New England apples, and is unquestionably a first-rate fruit in all respects. It is a native of Massachusetts, and is more largely cultivated for the Boston market than any other sort. Tree vigorous, upright, spreading, productive. Young shoots dull reddish brown. Fruit large, roundish, and narrowing a little to the eye. Color yellow in the shade, but nearly covered and striped with crimson, red, and orange in the sun, dotted with a few russet dots, and with radiating streaks of russet about the stalk. Calyx closed, and set in a rather narrow plaited basin. Stalk half to three-fourths of an inch long, rather slender for so large a fruit, planted in an even, moderately deep cavity. Flesh yellowish white, crisp, with that agreeable mingling of the saccharine and acid which constitutes a rich, high flavor. Very good. The tree is a vigorous, upright grower, and bears most abundantly. Ripe from November to March, but with us it is perfection in January.

GOLDEN SWEET.

Synonyms: Orange Sweeting and Early Golden Sweet.

A celebrated Connecticut fruit. Tree very vigorous, spreading, forming a tree of moderate size, hardy and very productive. Young shoots reddish brown. Fruit above the medium size, roundish, scarcely flattened, fair, and well formed; when fully ripe, pale yellow or straw color. Stalk about an inch long, slender at its junction with the fruit. Calyx closed, and set in a basin of moderate depth. Flesh tender, sweet, rich, and excellent. Good to very good. August and September. A valuable sort for cooking, market, or stock feeding.

COOPER'S EARLY (WHITE).

Grown in Illinois and other Western states, where it is regarded by many as productive and profitable. Fruit medium, roundish, little flattened, pale yellow with faint blush, tinge of green at the stem. Flesh white, crisp, sprightly. September and October. (Elliott).

NORTHERN SPY.

This beautiful American fruit is one of the most delicious, fragrant and sprightly of all late dessert apples. It ripens in January, keeps until June, and always commands the highest market price. The tree is of rapid, upright growth, and bears moderate crops. It originated on the farm of Herman Chapin, of East Bloomfield, near Rochester, N. Y. The trees require high culture, and open heads to let in the sun; otherwise the fruit is wanting in flavor, and apt to be imperfect and knotty. Young shoots dark, reddish brown. The tree blooms late, often escaping vernal frosts. Fruit large, roundish, oblate, conical. Skin thin, smooth, in the shade greenish or pale yellow, in the sun covered with light and dark stripes of purplish red, marked with a few pale dots, and a thin white bloom. Stalk three-fourths of an inch long, rather slender, planted in a very wide, deep cavity, sometimes marked with russet. Calyx small, closed. Basin narrow,

abrupt, furrowed. Flesh white, fine grained, tender, slightly subacid, with a peculiarly fresh and delicious flavor. Core large and open. Very good to best. December to June.

DUCHESS OF OLDENBURG.

Synonyms : Smith's Beauty of Newark, Russian, Borovitsky, and New Brunswick.

This handsome Russian apple proves one of the most hardy and profitable varieties in cultivation, especially in our northwestern sections. The tree is vigorous, forming a roundish, upright, spreading head, requiring little or no pruning, and producing abundantly a fruit of fair, even and regular size, that, although not of the first quality, always commands a ready sale, as it is valuable for market and cooking, and passably good for dessert. Young shoots smooth, reddish. Fruit medium size, regularly formed, roundish oblate. Skin smooth, finely washed and streaked with red on a golden or yellow ground. Calyx pretty large and nearly closed, set in a wide, even hollow. There is a faint blue bloom on this fruit. The flesh is juicy, sprightly subacid. Ripens early in September.

EARLY HARVEST.

Synonyms : Prince's Harvest, July Pippin, Yellow Harvest, Large White Juneating, Tart Bough, Early French Reinette, and Sinclair's Yellow.

An American apple; and taking into account its beauty, its excellent qualities for the dessert and cooking, and its productiveness, we think it the finest early apple yet known. It begins to ripen about the first of July, and continues in use all that month. The smallest collection of apples should comprise this and the Red Astrachan. Trees moderately vigorous, upright, spreading. Young shoots reddish brown. Fruit medium size. Form roundish, often roundish oblate, medium size. Skin very smooth, with a few faint white dots, bright straw color when fully ripe. Stalk half to three-fourths of an inch long, rather slender, inserted in a hollow of moderate depth. Calyx set in a shallow basin. Flesh very white, tender and juicy, crisp, with a rich, sprightly subacid flavor. Very good to best. Core small.

TWENTY OUNCE.

Synonyms : Morgan's Favorite, Eighteen Ounce Apple, Aurora, Coleman, Cayuga Red Streak, Lima, and Wine of Connecticut.

A very large and showy apple. It is a good, sprightly fruit, though not very high flavored, but its remarkably handsome appearance and large size render it one of the most popular fruits in the market. The tree is thrifty, and makes a compact, neat head; bears regular crops, and the fruit is always fair and handsome. Young wood rich, brownish red. Fruit very large, roundish, slightly uneven, greenish yellow, boldly splashed and marbled with stripes of purplish red. Stalk short, set in a wide, deep cavity. Calyx small. Basin moderately deep. Flesh coarse grained, sprightly, brisk subacid. Good to very good. October to January.

SWEET BOUGH.

Synonyms : Large Yellow Bough, Early Sweet Bough, August Sweet, Sweet Harvest, Bough, and Washington.

A native apple, ripening in harvest time, and one of the first quality, only second as a dessert fruit to the Early Harvest. It is not so much esteemed for the kitchen as the latter, as it is too sweet for pies and sauce, but it is generally much admired for the table, and is worthy of a place in every collection. Fruit above the middle size, and oblong ovate in form. Skin smooth, pale greenish yellow. Stalk rather long, and the eye narrow and deep. Flesh white, very

tender and crisp when fully ripe, and with a rich, sweet, sprightly flavor. Ripens from the middle of July to the 10th of August. Tree moderately vigorous, bears abundantly, and forms a round head. Young shoots grayish brown, very slightly downy.

PEWAUKEE.

Raised from seed of Duchess of Oldenburg by George P. Pepper, of Pewaukee, Wis., who sends us specimens, and writes that the tree is strong and vigorous, center upright, very spreading, an annual bearer, and one of the hardiest and best for the Northwest; young shoots dark, brownish red. Fruit medium to large, roundish oblate, skin bright yellow, striped, splashed and mottled with light and dark red over most of the surface, covered with a thin greenish bloom, and many large and small light dots, a few being aureole; stalk short, small; cavity small; calyx closed; basin medium, slightly corrugated; flesh white, a little coarse, breaking, half tender; juicy, subacid, slightly aromatic; good; core small. January to May.

NELSON SWEET.

Origin unknown. Fruit medium to large. Form roundish oblate, regular. Color dull green, becoming yellow, sometimes bronzed with dull brown. Stalk rather long, slender. Cavity medium, acute, regular, green. Calyx medium, closed. Segments reflexed. Basin small, uneven. Flesh greenish yellow, firm, fine grained, juicy, sweet. Core medium. Good. May to July. (*American Journal of Horticulture.*)

RED ASTRACHAN.

Synonyms: Deterding's Early, Astrachan Rogue, Robert Astrakan, Vermilion d'Ete, and Abe Lincoln.

A fruit of extraordinary beauty, first imported into England, with the White Astrachan, from Sweden, in 1816. It bears abundantly with us, and its singular richness of color is heightened by an exquisite bloom on the surface of the fruit, like that of the plum. It is one of the handsomest dessert fruits, and its quality is good, but if not taken from the trees as soon as ripe it is liable to become mealy. Tree a vigorous grower, upright, spreading. An early and abundant bearer. Young shoots clear, reddish brown. Fruit pretty large, rather above the middle size, and very smooth and fair, roundish, a little narrowed toward the eye. Skin almost entirely covered with deep crimson, with sometimes a greenish yellow in the shade, and occasionally a little russet near the stalk, and covered with a pale white bloom. Stalk rather short and deeply inserted. Calyx partially closed, set in a slight basin, which is sometimes a little irregular. Flesh quite white, crisp, moderately juicy, with an agreeable, rich, acid flavor. Good to very good. Ripens from last of July to middle of August.

BALTZBY.

From Virginia. Tree spreading, productive. Fruit large, oblate, yellowish white, with a faint blush. Dots scattered, small, white. Flesh white, firm, somewhat tough, juicy, almost sweet. Good. October.

MOUNTAINEER.

Synonym: Mountain Sweet.

From Pennsylvania. Fruit large, oblate, light yellow. Dots minute. Calyx small, closed. Stalk short, slender. Flesh white, breaking, very tender, fine grained, juicy, sweet. Good to very good. December. (Warder.)

IMPERIAL.

Of French origin. Fruit medium, oblate inclined to conic, yellow, shaded, splashed and striped with light and dark red, deepest in the sun. Stalk short.

Calyx closed. Flesh white, crisp, tender, juicy, refreshing subacid. Good. October and November. (Warder.)

FULTON STRAWBERRY.

Originated with A. G. Downing, Canton, Fulton county, Illinois. Tree vigorous, stout, spreading grower, hardy; does not come early into bearing. Young wood grayish brown, slightly downy. Fruit medium, oblate, whitish, mostly overspread, striped, splashed and mottled with shades of red. Flesh whitish, tinged with pink, juicy, pleasant subacid. Good. Core small. September.

ENGLISH SWEET.

Synonyms: Ramsdell's Sweet, Ramsdell's Sweeting, Ramsdell's Red Pumpkin Sweet, Avery Sweet, and Ramsdell's Red Winter.

This old variety is esteemed where grown for the large crops which it bears, and as a showy sweet apple for market, and profitable for stock feeding, as well as superior for cooking. The tree is very vigorous, grows remarkably straight and upright, comes early into bearing, and yields enormously every year. Young shoots clear, reddish brown, slightly grayish. Fruit rather above medium size, oblong, regularly shaped, and tapering slightly towards the eye; dark red, dotted with fawn-colored specks, and covered with a blue bloom. Flesh yellowish, very tender and mellow, usually sweet and rich. Good to very good. In weight the apple is light. October to February.

WHITE JUNEATING.

Synonyms: Joanneting, Juniting, Gennetting, Primiting, May of Virginia, Jenetting, Juneting, May Pippin, Caroline, Early May, Owen's Golden Beauty, Juneating, Ginetting, Early Jenetting, Yellow May, Carolina.

This is an old variety, mentioned by Evelyn in 1660, and described by Ray in 1688, and is a very tolerable little apple, ripening among the very earliest, during the last of June and the first of July. It is very distinct from the Early Harvest, sometimes called by this name. Tree a moderate grower, and forms a roundish, upright, spreading head. Productive. Fruit small, round, a little flattened. Calyx closed. Stalk rather long and slender. Pale green at first, light yellow with sometimes a faint blush on the sunny side. Flesh crisp and of a pleasant flavor, but soon becomes dry. Good.

HUBBARDSTON NONSUCH.

Synonyms: John May, Old Town Pippin, and Hubbardston.

A fine, large, early winter fruit, which originated in the town of Hubbardston, Mass. The tree is a vigorous grower, forming a handsome branching head, and bears very large crops. Young shoots dull, grayish brown, slightly downy. It is worthy of extensive orchard culture. Fruit large, roundish oblong, much narrowed near the eye. Skin smooth, striped with splashes and irregular broken stripes of pale and bright red, which nearly cover a yellowish ground. Calyx open. Stalk short, in a russeted hollow. Flesh yellow, juicy, and tender, with an agreeable mingling of sweetness and acidity in its flavor. Very good to best. October to January.

HOLLAND PIPPIN.

Synonyms: Summer Pippin, Pie Apple.

This and the Fall Pippin are frequently confounded together. They are indeed of the same origin. One of the strongest points of difference lies in their time of ripening. The Holland Pippin begins to fall from the trees and is fit for pies about the middle of August, and from that time to the first of November is one of the very best kitchen apples. Fruit very large, roundish, a little more

square in outline than the Fall Pippin, and not so much flattened, though a good deal like it, a little narrowed next the eye. Stalk half an inch long, thick, deeply sunk. Calyx small, closed, moderately sunk in a slight plaited basin. Skin greenish yellow or pale green, becoming pale yellow when fully ripe, washed on one side with a little dull red or pale brown, with a few scattered, large, greenish dots. Good.

YELLOW TRANSPARENT.

A new Russian variety, which was imported from St. Petersburg in 1870 by the department of agriculture, Washington, D. C., and promises to be valuable for a cold climate as an early fruit of good quality, ripening before the Tetofsky, with more tender and delicate flesh, but does not continue long in use. It is said that the tree so far has proved to be very hardy, moderately vigorous, upright, an early and good bearer annually. Fruit medium, roundish, oblate, slightly conical, slightly angular; skin clear white at first, becoming pale yellow when fully mature, moderately sprinkled with light and greenish dots, somewhat obscure. Stalk short to medium, rather slender; cavity rather large, sometimes a little greenish; calyx closed; basin medium, slightly corrugated, sometimes small protuberances; flesh white, half fine, tender, juicy, sprightly subacid; quality good to very good. Core medium. Season early in August, and a week or two before Tetofsky.

BENTLEY'S SWEET.

Origin unknown. Supposed Virginia. Tree moderately vigorous, hardy, good bearer and keeper, valuable in the Southwest in rich soils. Fruit medium, roundish, flattened at ends, sometimes slightly oblique, and sometimes sides unequal, pale yellowish green, shaded with pale red and; moderately sprinkled with light and brown dots. Stalk long, slender, curved. Cavity smooth, deep. Calyx large, closed, or partially open. Segments medium length, erect, sometimes a little recurved. Basin large, deep, corrugated. Flesh fine, whitish, compact, sweet, somewhat honeyed flavor. Core small. Very good. January to May.

EARLY RIPE.

Supposed origin, Pennsylvania, but unknown. Tree a free grower, and productive. Fruit medium, roundish oblate, pale yellow, sprinkled with a few gray dots. Stalk long, in a slightly russeted cavity. Calyx small, closed. Flesh white, tender, juicy, subacid. Good. August.

DOCTOR WATSON.

Synonym: Autumn Seek-no-farther.

Origin unknown. A variety considerably grown in Indiana, where it is much esteemed. Tree moderately vigorous, spreading, productive. Fruit medium, oblate, sides sometimes unequal. Color greenish white, shaded and splashed in the sun with dull crimson. Stalk of medium length. Cavity broad, uneven. Calyx open. Basin large, rather deep. Flesh whitish yellow, rather firm, juicy, rich subacid. Core medium. Very good. September and October.

MUSTER.

Origin unknown. Fruit oblate, yellow, mostly covered with mixed red and splashes of crimson. Flesh yellow, fine grained, tender, juicy, subacid, aromatic. Best. Core small. August and September. (Warder.)

WAGENER.

Origin, Penn Yan, Yates county, New York. Tree thrifty, upright, hardy, and early bearer. Requires thinning to produce good-flavored fruit. When grown in the shade is wanting in flavor. Young wood light, reddish brown, slightly downy.

Buds prominent. Fruit medium or above, roundish oblate, yellow, mostly shaded with crimson, obscurely striped, and splashed with light dots. Stalk nearly an inch long, rather slender, inserted in a large, broad, irregular cavity. Calyx small and closed, set in a rather abrupt, somewhat corrugated basin. Flesh yellowish, very tender, juicy, excellent, brisk, somewhat vinous. Very good to best. A very delicate apple. Ripe November to February.

BROADWELL.

Synonym: Broadwell Sweet.

Originated with Jacob Broadwell, near Cincinnati, Ohio. An extremely valuable sweet apple, either for the table or cooking. Tree vigorous, quite hardy, very spreading, irregular, productive. Young shoots dull, reddish brown, downy. Fruit medium, oblate, somewhat conic. Color clear, bright yellow, brownish blush in the sun exposure, with carmine spots. Dots few, greenish, suffused beneath. Stalk rather short. Cavity broad, russeted. Calyx closed, with short segments. Basin regular. Flesh whitish, firm, juicy, rich, sweet. Core small. Very good. November to February.

SUPERB.

Origin, Franklin county, North Carolina. Tree tolerably vigorous, spreading, and a prodigious bearer. Fruit medium or above, roundish, oblate, regular. Skin green, rarely with a blush. Stalk of medium length, in a shallow cavity. Calyx large and open. Flesh yellow, solid, slightly coarse grained, rich, subacid. Good to very good. November to March.

RAMBO.

Synonyms: Fall Romanite, Gray Romanite, Striped Rambo, Delaware, Romanite, Seek-no-further, Bread and Cheese, Rambouillet, Trumpington, Large Rambo, and Terry's Redstreak.

The Rambo is one of the most popular autumn or early winter fruits. It is a highly valuable apple for the table or kitchen, and the tree thrives well on light, sandy soil, being a native of the banks of the Delaware. The tree is of a vigorous, rather spreading habit, quite productive. Fruit of medium size, flat, smooth, yellowish white in the shade, streaked and marbled with pale yellow and red in the sun, and speckled with large rough dots. Stalk long, rather slender, curved to one side, and deeply planted in a smooth, funnel-like cavity. Calyx closed, set in a broad basin, which is slightly plaited around it. Flesh greenish white, very tender, rich, mild subacid. Very good. October to December. There is claimed to be distinct or subvariety of this, called Red Rambo, the fruit of which is more red; otherwise there is no perceptible difference.

ROME BEAUTY.

Synonym: Gillett's Seedling.

Origin, southern Ohio. Tree a moderate grower; succeeds well at the Southwest. Young wood clear, reddish brown, slightly downy or gray. A late bloomer. Fruit large, roundish, approaching conic, yellow, shaded and striped with bright red, and sprinkled with light dots. Stalk an inch long, inserted in a large, deep cavity, surrounded by greenish russet. Calyx partially closed, set in a narrow, deep basin. Flesh yellowish, tender, juicy, sprightly, subacid. Good. Core rather large. October to December.

ROMAN STEM.

Originated at Burlington, N. J., and is much esteemed there. Tree very productive, spreading, irregular. Fruit scarcely of medium size, roundish,

whitish yellow, with a faint brownish blush, sprinkled with patches of dark russet, and, when ripe, having a few reddish specks, unless the fruit is very fair. Stalk three-fourths of an inch long, inserted in a shallow cavity under a fleshy protuberance. Calyx set in a rather narrow basin, with a few plaits. Core hollow. Flesh tender, juicy, with a rich, pleasant, musky flavor. Very good. November to March.

SNOW.

Synonyms: Fameuse and Snow Chimney.

A very celebrated Canada fruit (probably an old French variety), which has its name from the snow-white color of its flesh, or, as some say, from the village from whence it was first taken to England. It is an excellent, productive, autumn apple, and is especially valuable in northern latitudes. Tree moderately vigorous, round-headed, hardy. Young shoots reddish brown. Fruit of medium size, roundish, somewhat flattened. Skin with a ground of pale, greenish yellow, mixed with faint streaks of pale red on the shady side, but marked with blotches and short stripes of darker red, and becoming a fine, deep red in the sun. Stalk quite slender, half an inch long, planted in a narrow, funnel-shaped cavity. Calyx small, and set in a shallow, rather narrow basin. Flesh remarkably white, very tender, juicy, and with a slight perfume. Very good. Ripe in October and November. A regular bearer and a handsome dessert fruit. There is a variety under the name Striped-Fameuse, claimed to be distinct, the fruit being more striped and less highly colored.

AUTUMN STRAWBERRY.

Synonym: Late Strawberry.

Origin, Aurora, N. Y., on lands formerly owned by Judge Phelps. Tree vigorous, upright, spreading, hardy. Young wood smooth, reddish brown; a regular and early bearer. Fruit medium, roundish, inclined to conic, sometimes obscurely ribbed. Color whitish, striped and splashed with light and dark red, and often covered with a thin bloom. Stalk rather long, slender, curved. Cavity large, deep, slightly russeted. Basin abrupt, corrugated. Flesh yellowish white, tender, juicy, pleasant, vinous subacid. Very good. October to December.

GILPIN.

Synonyms: Carthouse, Small Romanite, Gray Romanite, Roman Knight, Romanite of the West, and Little Romanite.

A handsome cider fruit, from Virginia, which is also a good table fruit from February to May. A very hardy, vigorous and fruitful tree. Fruit of medium size, roundish, oblong. Skin very smooth and handsome, richly streaked with deep red and yellow. Stalk short, deeply inserted. Calyx in a round, rather deep basin. Flesh yellow, firm, juicy, and rich, becoming tender and sprightly in the spring. Good.

MILAM.

Synonyms: Harrigan, Winter Pearmain, Blair, and Thomas.

Origin uncertain; much grown in some sections of the West; very productive, and keeps well. Fruit medium or below, roundish, greenish, shaded and striped with red. Flesh rather firm, pleasant subacid, not rich. Good. December to March.

LIMBER TWIG.

Synonym: James River.

An apple much cultivated South and West. Origin, supposed North Carolina. Tree hardy and productive, roundish, spreading, somewhat drooping. Fruit medium or above, roundish oblate, inclining to conic, greenish yellow,

shaded and striped with dull crimson, and sprinkled with light dots. Stalk of medium length, inserted in a broad, deep cavity, surrounded by thin, green russet. Calyx closed, set in a small, uneven basin. Flesh whitish, not very tender, juicy, with a brisk, subacid flavor. Good. January to April.

BENONI.

This excellent early apple is a native of Dedham, Mass. The tree is of vigorous, upright, spreading habit; hardy and productive; light, reddish brown. It is a valuable variety for market or table use. Fruit rather below medium size. Form roundish, oblate conical. Color pale yellow, shaded, striped and marbled with dark crimson, and thinly sprinkled with bright dots. Stalk short, slender. Cavity deep, russeted. Calyx closed. Segments persistent, sometimes a little recurved. Basin abrupt, quite deep, somewhat uneven. Flesh yellow, juicy, tender, pleasant subacid. Core small. Very good. August.

ORTLEY.

Synonyms: Ortley Pippin, Woolman's Long, Greasy Pippin, White Bellflower, Van Dyne, Melting Pippin, Yellow Pippin, Woodward's Pippin, Davis White Bellflower, White Bellflower, White Detroit, Hollow-cored Pippin, Green Bellflower, Jersey Greening, Crane's Pippin, Inman, Tom Woodward's Pippin, Marrow Pippin, Ohio Favorite, Willow-leaf Pippin, White Pippin, Detroit, Davis, Warren Pippin, Golden Pippin, White Seek-no-further, and Tod's Golden Pippin.

Origin, orchard of Michael Ortley, South Jersey. It grows pretty strongly, with upright, slender shoots, and bears abundantly. Fruit medium to large, roundish, oblong conic, greenish yellow, becoming fine yellow at maturity, sometimes with a sunny cheek. Stalk slender, of medium length, inserted in a deep, acute cavity, surrounded by russet. Calyx closed, set in an abrupt, somewhat corrugated basin. Flesh white, fine grained, tender, juicy, subacid, very pleasant. Good to very good. Core large. November to February.

STAYMAN'S SUMMER.

Originated on the grounds of Dr. J. Stayman, Leavenworth, Kan. Tree hardy, vigorous, spreading, irregular, tough, wiry, droops like a weeping willow with ropes of fruit, never breaking a limb. An early bearer and very productive, very nearly equal to Benoni and Summer Pearmain, and handsomer. Fruit medium, round, regular, approaching conic; skin smooth, greenish yellow, splashed and striped with red and purple, covered with a white bloom; dots small, gray, scattered. Stem medium, rather slender. Cavity narrow, deep, irregular, russeted. Eye very small, closed. Basin narrow, shallow, furrowed. Core small, slightly open. Flesh greenish white, very juicy, brittle, sprightly, high flavored, mild acid. Very good. Use: Kitchen, table, and market. August and September. (*Western Pomologist.*)

STAYMAN'S WINESAP.

A seedling of the Winesap, originated with Dr. J. Stayman, Leavenworth, Kan. We give his description: "Tree very vigorous, open, irregular, spreading. Wood very dark; dark heavy foliage. An early and very abundant bearer. Tree much in appearance like the Winesap. Fruit hangs well on the tree. Fruit medium to large, heavy, oblate conical, regular, greenish yellow, mostly covered and indistinctly splashed, mixed and striped with dark, dull red; dots medium, numerous, distinct gray. Stem of medium length, slender. Cavity wide, deep, much russeted, extending, regular. Calyx large, open, or half closed. Segments large, erect. Basin rather narrow, abrupt, deep, furrowed. Core medium. Flesh yellow, firm, tender, juicy, rich, mild subacid, aromatic. Quality best. Season January to May."

GARRETTSON'S EARLY.

Synonyms: Somerset Harvest.

Originated on the farm of John Garrettson, Somerset, N. J. Tree vigorous, upright, spreading, productive. Young wood brown, slightly downy. Fruit medium, roundish conic, yellowish, thickly covered with light specks. Stalk short. Cavity deep, acute. Calyx closed, in a small, abrupt, furrowed basin. Flesh white, tender, juicy, brisk subacid. Good; valuable for cooking. September.

EARLY SUMMER PEARMAIN.

Synonym: American Summer Pearmain.

A rich, highly flavored fruit, much esteemed where it is known. It appears to be quite different from the Summer Pearmain (of the English), and is probably a seedling raised from it. It ripens gradually from the 10th of August to the last of September. Tree moderately vigorous, with slender branches, round headed. Young shoots dull, reddish brown. Fruit of medium size, oblong, widest at the crown, and tapering slightly to the eye. Skin red, spotted with yellow in the shade, but streaked with livelier red and yellow on the sunny side. Stalk three-fourths of an inch long, and pretty deeply inserted. Eye deeply sunk. Calyx closed. Segments short, erect. Basin abrupt, slightly corrugated. Flesh yellow, remarkably tender, with a rich and pleasant flavor. It often bursts when falling from the tree. Quality best. Core medium.

EARLY JOE.

Origin, orchard of Herman Chapin, Ontario county, New York. Tree of slow growth, productive; requires high culture for fair fruit. Fruit below medium, oblate, very slightly conic, smooth, yellowish, shaded and striped with red, and thickly sprinkled with greenish spots. Stalk of medium length, inserted in a large cavity surrounded by russet. Calyx closed. Basin moderate. Flesh whitish, tender, juicy, with a very agreeable vinous flavor. Best. Ripe middle of August to middle of September.

JEFFERIS.

Origin, Chester county, Pennsylvania. Growth medium, very productive. A fair and handsome fruit, of excellent quality, in use all of September. Young wood light, reddish brown, smooth. Fruit medium, oblate, inclined to conic, yellow, shaded and splashed with crimson, and thickly covered with large whitish dots. Stalk very short, inserted in a rather large cavity. Calyx closed, set in a round, open basin. Flesh white, tender, juicy, with a rich, mild, subacid flavor. Very good. September.

WHITE PIPPIN.

Synonym: Canada Pippin.

This apple is much cultivated at the West, but of unknown origin. It is of the Newtown Pippin class, distinct from Canada Reinette. Tree thrifty, upright, a regular and good bearer. Young shoots dark, clear, reddish brown, downy. Fruit large, form variable, roundish, oblate, slightly oblique, greenish white, waxen, sprinkled with green dots, and becoming pale yellow at maturity, sometimes having a dull blush and a few brown dots. Stalk short, inserted in a large cavity, surrounded by green russet. Calyx small, nearly closed, set in an abrupt-furrowed basin. Flesh white, tender, crisp, juicy, fine, rich subacid. Very good to best. Core small. January to March.

DOMINIE.

Synonyms: English Rambo, Wells, Cheat, Hogan, Striped Rhode Island Greening, Cling Tight, English Red Streak, and English Beauty of Pennsylvania. This apple, extensively planted in the orchards on the Hudson and west, so

much resembles the Rambo externally that the two are often confounded, and the outline of the Rambo may be taken as nearly a *facsimile* of this. The Dominie is, however, of a livelier color, and the flavor and season of the two fruits are very distinct, the Rambo being rather a high-flavored early winter apple, while the Dominie is a sprightly, juicy, long-keeping winter fruit. Fruit of medium size, flat. Skin lively greenish yellow in the shade, with stripes and splashes of bright red in the sun, and pretty large russet specks. Stalk long and slender, planted in a wide cavity, and inclined to one side. Calyx small, in a broad basin, moderately sunk. Flesh white, exceedingly tender and juicy, with a sprightly, pleasant, though not high flavor. Young wood of a shoot lively light brown, and the trees are very hardy, and the most rapid growers and prodigious early bearers that we know—the branches being literally weighted down by the rope-like clusters of fruit. The Dominie does not appear to be described by any foreign author. Coxe says that he received it from England, but the apple he describes and figures does not appear to be ours, and we have never met with it in any collection here. It is highly probable that the Dominie is a native fruit. It is excellent from December to April.

RHODE ISLAND GREENING.

Synonyms: Burlington Greening, Russine, Bell Dubois, and Jersey Greening.

The Rhode Island Greening is such a universal favorite, and so generally known, that it seems superfluous to describe it. It succeeds well in most of the northern sections of the United States, and on a great variety of soils. Where it succeeds it is one of the most esteemed and profitable among early winter fruits. [In Kansas it drops too early.] Tree a very vigorous, spreading grower. Young shoots reddish brown. Very productive. [Shy in Kansas.] Fruit large, roundish, a little flattened, pretty regular, but often obscurely ribbed, dark green, becoming greenish yellow when ripe, when it sometimes shows a dull blush near the stalk. Calyx small, woolly, closed, in a slightly sunken, scarcely plaited basin. Stalk three-fourths of an inch long, curved, thickest at the bottom. Flesh yellow, fine grained, tender, crisp, with an abundance of rich, sprightly, aromatic, lively, acid juice. Very good: November to February.

PENNOCK.

Synonyms: Pomme Roye, Large Romanite, Prolific Beauty, Roman Knight, Big Romanite, Neisley's Winter Penick, Pelican, Red Ox, Red Pennock, Pennock's Red Winter, and Gay's Romanite.

Origin, Pennsylvania. Tree a strong, vigorous, upright, spreading grower, and very productive. Fruit quite large, oblique, generally flat, but occasionally roundish oblong, fine, deep red, with faint, indistinct streaks of yellow. Flesh yellow, tender and juicy, with a pleasant, half-sweet flavor. Good. November to March.

KESWICK CODLIN.

A noted English cooking apple, which may be gathered for tarts as early as the month of August, and continues in use till November. It is an early and a great bearer and a vigorous tree, and is one of the most profitable of orchard sorts for cooking or market. Tree very hardy, forming a large, regular, upright, spreading, round head. Fruit a little above the middle size, rather conical, with a few obscure ribs. Stalk short and deeply set. Calyx rather large. Skin greenish yellow, washed with a faint blush on one side. Flesh yellowish white, juicy, with a pleasant acid flavor.

EMPEROR.

Described by Verry Aldrich in the *Prairie Farmer* as follows: Fruit medium, roundish, one-sided, orange, striped and shaded with red on the sun side, covered with white specks. Stalk short and slender. Cavity deep. Flesh white, fine grained, tender, juicy, pleasant, almost sweet.

EARLY-MARGARET.

Synonyms: Margaret or Striped Juneating, Early Red Juneating, Red Juneating, Striped June, Eve Apple of the Irish, and Margaretha Apfel of the Germans.

An excellent early apple, ripening about the middle of July, or directly after the Early Harvest. The tree while young is rather slender, with reddish brown, upright, woolly shoots. It is a moderate bearer. Fruit below medium size, roundish oblate, tapering towards the eye. Skin greenish yellow, pretty well covered by stripes of dark red. Flesh white, subacid, and, when freshly gathered from the tree, of a rich, agreeable flavor. Good.

MOTHER.

Synonyms: Queen Anne, Gardener's Apple.

Origin, Bolton, Mass. Tree moderately vigorous, upright, and productive. Young shoots grayish brown, downy. One of the best of apples for dessert; rather too tender for shipment. Fruit medium. Form roundish, slightly conical. Color yellow, almost entirely overspread with light, clear, rich red, splashed and marbled with many deeper shades, many minute little dots. Stalk short, small. Cavity acute, often a little russeted. Calyx closed. Basin small, corrugated. Flesh yellow, tender, juicy, rich, aromatic subacid. Best. November to February.

ARKANSAS BLACK.

Medium, slightly conical, regular, smooth, glossy; yellow, generally covered with deep crimson, small, light-colored dots. Basin shallow. Eye small, closed. Cavity shallow, russeted. Stem medium. Flesh very yellow, fine grained, firm, juicy, subacid, rich. Very good. Arkansas. (Thomas.)

WHITNEY.

Medium, handsome, rich, good. Very hardy. Illinois. (Thomas.)

NOTE.

All the descriptions of apples given here are taken from Downing's "Fruit and Fruit-trees of America," excepting otherwise noted.

THE STATE, BY DISTRICTS.

For convenience, Kansas was divided by the official board into four fruit districts, simply quartering the state. The first district is composed of the following twenty-seven counties, in the northeast quarter. Reports, or rather experiences, from each of these counties will be found immediately following. We give below the number of apple trees in the first district, compiled from the statistics of 1897. Many thousands were added during the spring of 1898.

DISTRICT No. 1—APPLE TREES, 1897.

	<i>Bearing.</i>	<i>Not bearing.</i>	<i>Total.</i>
Atchison county.....	150,024	70,691	220,715
Brown county.....	160,583	57,488	218,071
Clay county.....	89,725	26,087	115,812
Cloud county.....	68,832	24,451	93,283
Dickinson county.....	110,351	31,926	142,277
Doniphan county.....	156,661	163,701	320,362
Douglas county.....	159,706	120,375	280,081
Franklin county.....	126,906	70,831	197,737
Geary county.....	39,148	19,357	58,505
Jackson county.....	123,485	84,533	208,018
Jefferson county.....	120,509	86,837	207,346
Johnson county.....	88,395	69,709	158,104
Leavenworth county.....	199,212	216,015	415,227
Marshall county.....	157,279	66,556	223,835
Miami county.....	101,541	82,069	183,610
Morris county.....	93,182	45,555	138,737
Nemaha county.....	140,278	62,535	202,813
Osage county.....	246,265	56,478	302,743
Ottawa county.....	40,538	30,149	60,687
Pottawatomie county.....	117,234	50,079	167,313
Republic county.....	128,076	58,662	186,738
Riley county.....	103,053	44,640	147,693
Saline county.....	74,648	24,400	99,048
Shawnee county.....	207,779	130,720	338,499
Wabaunsee county.....	108,942	50,195	159,137
Washington county.....	152,768	80,194	232,962
Wyandotte county.....	112,541	79,903	192,444
C Total in district.....	3,377,661	1,894,136	5,271,797
A verage, about.....	600,000	300,000	900,000

FRED WELLHOUSE & SON: Have been in Kansas since 1859, and grow no fruit but apples, having 117 acres in Leavenworth county, planted in 1876; 160 acres in Miami county, planted in 1878; 160 acres in Leavenworth county, planted in 1879; 800 acres in Osage county, planted in 1889, 1890, and 1891; 300 acres in Leavenworth county, planted in 1894; 140 acres in Leavenworth county, planted in 1896—total of about 100,000 trees, set out from two to twenty-two years. We prefer for commercial orchard, Jonathan, Missouri Pippin, Ben Davis, Winesap, and York Imperial, and for family orchard would add to these, Red June, Chango, Maiden's Blush, Huntsman, and Rome Beauty. We tried sixteen acres of Cooper's Early White, but have discarded them as unprofitable, shy bearers. We consider upland the best if soil is of good quality. We have them on all slopes;

can see no particular difference where soil is equal. We prefer rich, black soil (vegetable mold), clay subsoil. We plant in furrows, the rows thirty-two feet apart, the trees sixteen feet apart in the rows, running north and south.

The best trees to plant are two years old, the lowest limb or limbs not over two feet from the ground. We grow most of our trees from our own root grafts. Cultivation: We cultivate for the first five years, by throwing the soil first to and then from the trees, with a single or a double turning plow, and grow only corn. At five years from planting we sow the ground to clover, and this with other growths, such as weeds, is left on the ground as a mulch and fertilizer. We have never used any windbreaks at any of our orchards. Think they would be an advantage in some localities. We use traps for rabbits, knife and wire for borers. We prune very little, such as removing broken limbs. We have never fertilized any of our orchards. We do not believe it pays to pasture orchards, and do not allow it.

The insects that trouble us most are: Canker-worm, tent-caterpillar, fringed-wing bud moth, handmaid-moth or yellow-necked caterpillar, roundheaded borer and the tussock-moth caterpillar on our trees; and codling-moth, gouger and tree cricket on and in our fruit. We spray annually, using a horse-power machine, illustrated in former reports of the State Horticultural Society, for the leaf-eating insects named, using London purple and clear water, sometimes adding lime. We spray before the blossom opens, for bud moth, canker-worm and tent-caterpillar, and after the petals have fallen for codling-moth, tussock-moth, and fall web-worm. We have been successful except as to bud moth and fall web-worm. We believe we have greatly reduced the codling-moth by spraying, and we know we have destroyed the canker-worm. Have never successfully combated borers, excepting with knife and wire. Fall web-worms are burned in the tree with a gasoline torch, or the small limbs with webs are removed and burned. We have as yet found no particular method for fighting the bud moth successfully.

We gather our apples by hand in common two-bushel seamless sacks, used in the same manner as for sowing grain. A strap of heavy leather is attached, making it easy for the shoulder. A hook and ring are also put on to facilitate the removal of the sack when emptying. We prefer common straight ladders, with sides from sixteen to twenty inches apart at the bottom and six inches at the top, rounds fourteen inches apart. We use bushel boxes for hauling from the orchard to packing-house. We sort into three grades: No. 1, No. 2, and culls. No. 1's are all sound and firm apples, of about from two and one-fourth to two and one-half inches in diameter, the size of the smallest depending on the variety. We put in the No. 2 grade those that have any defects barring them from the first grade, yet they make a good second-class for immediate use; we also pack in this grade any sound apples that run uniformly small.

Of all packages tried, we prefer and use the three-bushel barrel, 17 $\frac{1}{8}$ inch head and 28 $\frac{1}{2}$ inch stave. When one head is removed, the barrel is turned over and a rap with the hand removes all trash. If we are packing a fine grade of fruit, we put a piece of white paper, cut a little less than the diameter of the barrel, in before facing. Barrels are double-faced or plated. We are careful to have the barrels rocked or shaken often while being filled. The name of variety and our trade-mark is put on the barrel with stencil or rubber stamp. No. 1's and 2's are hauled to shipping station in barrels; culls in bulk in ordinary farm wagon. We have never sold our crop in the orchard; always preferred to have it picked and packed under our own supervision. Our apples have been sold in

car lots. Firsts and seconds have gone to wholesale dealers. Culls we have evaporated, sold to men who evaporate, to cider-mills, and to dealers who handle bulk apples.

For drying, we use the New York hop kiln, Rival No. 2 parers, and upright bleachers, all of which have been reasonably satisfactory. We believe them the best we can get, considering the class of evaporated fruit in demand. White stock is best handled in fifty-pound boxes; chops, peelings and cores in sacks. We always found a ready market for dried fruit. Some years it paid well.

We have wintered only in cold-storage plants, always in barrels, and it has been profitable. Ben Davis and Winesap have kept best, with Missouri Pippin a close second. Jonathan keeps well under proper conditions. If kept as late as March, it is generally necessary to repack, but not always. Our greatest loss has been on Jonathan, which in some instances, when kept late in the season, has reached ten per cent.

We have never irrigated or watered any part of our orchards.

Prices have ranged as follows with us: For No. 1, from \$1.50 to \$4; and No. 2, 90 cents to \$2 per barrel. Culls have brought from 25 cents to 60 cents per 100 pounds; evaporated apples from 4 to 13 cents per pound; all these free on board.

A. E. HOUGHTON, Weltbote, Washington county: I have lived in Kansas twenty-nine years; have 100 apple trees, fifteen years old, twelve inches in diameter. For commercial and family orchards, I prefer Ben Davis, Winesap, Rawle's Janet, Huntman's Favorite, Grimes's Golden Pippin, Rambo, and Jonathan. Have tried and discarded Dominie, Roman Stem, and Bellflower; the latter on account of shy bearing. Think bottom land, black, rich loam, and north aspect, the best. I prefer three-year-old, short, stout-bodied trees—the shorter the better—with limbs as low as they will grow. I cultivate my orchard to corn, potatoes or vines as long as it is possible to do the work. I use a plow, cultivator, and one-horse double-shovel plow. I cease cropping when they begin to bear, and plant to clover. I consider windbreaks essential; would not grow an orchard without one, and would use Osage orange, ash, Russian mulberry, or box-elder, planted in several rows on south and west.

I wrap my trees with corn-stalks to protect from rabbits, and wash them with strong soapsuds, for borers, in May and June. I prune a great deal to let the sun, light and air in; I think it beneficial and that it pays. I never thin; but think it would be beneficial when the apples are large enough to tell the good ones from the bad. I think it advisable to use fertilizers on poor land. I never pasture my orchard under any circumstances whatever; do not think it advisable. My trees are bothered with borers. Some worm troubles my apples. I do not spray.

I pick into a sack over the shoulder, as for sowing wheat. I sort into two classes as I pick, to avoid handling again, putting the sound, hand-picked in one pile and the windfalls in another; cover them with hay and let them stay out as long as I dare, then put them in the cellar; but the cellar is too warm; think an outdoor cellar or cave would be better; would like to put them in cold storage, which is far the best. I sell my apples in the orchard, or any way I can get the most for them; generally take them to town and sell them. I sell my second and third grades at home; feed the culls to the hogs. My best markets are Washington and Greenleaf. I have never tried distant markets. Never dry any. I store some apples in boxes, barrels, and bulk; am not very successful. I find that Winesap and Rawle's Janet keep best. I do not irrigate. Prices have been from fifty to seventy-five cents per bushel. There is not much sale for dried apples. We do most of our own work.

EDWIN TAYLOR, Delaware township, Wyandotte county: I have lived in Kansas twenty-seven years. Have about 5000 apple trees aged from eight to twelve years. The best varieties of apples for commercial orchards are not many. No one variety could be named which would be best for all locations or conditions. The Ben Davis is most largely planted in the West. Jonathan, Missouri Pippin, Willow Twig, Park's Keeper, are all valuable sorts. There are others. A family orchard is the most important orchard a farmer plants. It should contain a small number of trees and a large number of varieties. Two of a kind are a plenty. There should be at least twenty kinds. That will allow for a new variety to ripen in its season every two weeks or less in summer and fall and every three weeks during the winter. They should begin with the earliest and finish with the very longest keeper. These varieties will overlap, so that the farmer will almost always have two sorts to choose from. There should be sweet apples among them—particularly winter sweets.

The names, characteristics, qualities, description, etc., of the twenty to thirty varieties that make up an ideal orchard would require a long chapter, if the subject was fully treated. Beginners in tree buying should be cautioned not to let the nurseryman run in half a dozen trees of each kind for the family orchard on them. Two trees of a kind are plenty, particularly as the surplus of the family orchard commonly goes to waste. The names should be carefully registered, so there will be no wondering what an apple is when it begins to bear. You can't keep company satisfactorily with an apple that you don't know the name of, any better than you can an unknown man.

The best place to keep these family apples is in a dugout, in the side of a bank if possible, at all events good and deep, with the door at the north, and a good blow-hole in the south end. I don't know much about soils or location. I found myself in possession of some Kaw river timbered hills, clay soil carrying some sand; not good for much else; so I planted them—tops, sides, and draws—with apple trees, which have done well on the tops of the hills, sides of the hills, and in the valleys between the hills. Am inclined to suspect there is a great deal of gammon written about "slope" and "expanse" for orchards. My conclusion is that that is a good slope which you happen to have. Trees growing in the Kaw bottoms themselves, I observe, thrive and bear. The only cultivation I have ever given trees has been such as they got by being component parts of a corn-field, except that I have mainly given the tree rows extra cultivation, keeping them clean of grass and weeds. My orchards are now seeded to clover; clover is not valuable, for its own sake, among trees, but the trees thrive with it. Its greatest use, so far as I can see, is to make you mow the orchard where it is twice during the season. I prefer to stop cultivation in orchards when they are six years old.

I have no knowledge of windbreaks, but I have had a great deal of "mechanical destruction" done by borers and rabbits. Both these pests are good "mechanics" in their way and willing to work. I have the borers hunted spring and fall. Small trees I have protected from rabbits by stalks, paper, or veneering. Rabbits are not hard to head off, but they won't let a case go by default. Some people depend upon traps, dogs, guns, poison, cats, washes, wagon grease and liver to keep the rabbits away. I have known all of these to fail, but I have never known a tree well tied up with corn-stalks to suffer from "mechanical destruction" via the rabbit route, unless the string broke. There is no law against having a good string. The only pruning I have ever done has been to take out water sprouts. I don't know whether it paid or not. But I like the looks of a tree better without the pompadour effect a top full of sprouts gives it. Never

have thinned apples; orchards here are self-thinners. By picking time the fruit is fully half on the ground and commonly not too much on the trees. Have never used manure or any fertilizer on apple trees. I never pastured an orchard but once. One trial cured me. I judge that one trial is nearly always enough. It is not advisable to pasture orchards, not even with hogs. The greatest pest we have is the apple worm—son, I am told, of the codling-moth. Have made no effort to check it by spraying, or otherwise.

I pick apples by hand; drop them into a sack hung over the shoulder; when the sack is full, it is emptied onto a sorting table. Make two classes of fruit: No. 1 and culls. Have never used any package but the barrel. Prefer the full-sized flour barrel. Fill barrel full enough to prevent rattling, when head is pressed in; mark faced head with variety, quality, and my name and address. Have never sold crop in orchard; often sell culls there. Have never sold a greater amount than one car-load at one time; have sold as little as one peck. The best market is sometimes at one place, sometimes at another. Minneapolis is the most distant market I have ever tried. Have mostly put my apples in cold storage. About one time out of three they have kept well. The fault was not in the apples; cold storage is either not understood or frequently mismanaged. Cold-storage people should be made to guarantee their work!—should not be paid for apples that are not delivered in the spring. Cold-storage rates (fifty cents per barrel) are absurdly high. I use male help, young and old, good and bad. Help commonly hard to get here in the fall. Wages ordinarily one dollar per day, without board.

C. D. MARTINDALE, Scranton, Osage county: I have been on this place thirteen years, and since coming here have set every tree now on it. Trees that I set out in the spring of 1885 measure six to ten inches in diameter. In 1895 I put out 350 apple trees; in 1896 I planted 250 more, part of them were three- and four-year-old, when set. I lost only thirteen out of the 600. A few of the Missouri Pippins bore fruit last year. I consider the following varieties, in the order named, best for commercial orchard: Ben Davis, Jonathan, Winesap, Grimes's Golden Pippin; and for family use I would add Maiden's Blush, Cooper's Early White, Missouri Pippin, and Rawle's Janet. I have tried and discarded Smith's Cider and Lowell, as they blight too much. I prefer bottom land if it is properly drained, as it is apt to be richer and the trees will not suffer as much in a dry season—black loam, with a porous subsoil, to let the surplus water soak away. I think a northern slope best, as the trees do not suffer as much from the sun on hot summer days. Apple trees have done best for me on a black loam underlaid with a porous subsoil that will take the surplus water and still hold moisture in summer.

I plant by plowing light furrows (thirty-four feet apart) across the lay of the ground, then plowing two or four furrows together up and down the slope thirty-four feet apart, and run a lister in this big furrow, breaking up the ground as deeply as possible. I dip the roots of my trees in lye water, using one pound carbonate of lye to eight gallons of water. Then fill in with a spade around the roots, being careful not to leave any holes for mice to nest in. Two- or three-year-old trees, with roots and top well balanced, no forks to split down when the tree gets older, bark smooth and good color, I consider best. I prefer piece-root to whole-root grafts. My experience is that we get better trees on piece roots, as the union is lower down in the ground and the scion throws out roots, which makes the trees healthy and not wholly dependent on seedling roots. I cultivate my orchard till ten or twelve years old, and keep all weeds

and grass away, using an eight-inch plow with one horse next to the trees and backfurrow to every other row; then use two horses and fourteen-inch plow for the middles. The next year I backfurrow to the rows left the year before; in this way we have no large back or dead furrows, but keep the ground level. In cultivating I use a fourteen-tooth Peerless harrow each side of the row, and cultivate the rest with two-horse cultivator; then use a good sharp hoe close to the trees. Corn is the best crop to raise among young trees, as it acts as a wind-break and a partial shade. After an orchard gets to bearing, seed to red clover. I would change from corn to clover eight or nine years after setting.

Windbreaks are essential. I would have them on the south and west sides of the orchard, at least. I would make them of evergreen, Osage orange, or mulberry. I would not plant black walnut, cottonwood, or maple, as they are injurious to apple trees. Plant peach trees between the apple trees; they grow fast, and protect the apple until large enough to stand the winds. The best thing I have found to keep rabbits, mice, etc., off the trees is a protector made of five lath two feet long, woven with wire; they can be left on summer and winter, as sunlight and air can pass through to the bark and keep it healthy and keep the sun from scalding the bark; it also keeps the borers and the whippetree from doing much damage; they can be left on until the trees outgrow them. I cut out all limbs that are liable to rub each other at any future time, and all limbs that are liable to split down as the tree gets older; I also trim high enough to let a small horse walk under the limbs. I take off the back pad while working among the trees, so it will not be catching on the limbs; I think that it pays, and is beneficial. I have not thinned the fruit while on the trees. My trees are planted in alternate rows of different kinds, so I cannot tell what is best, blocks or mixed. I use all the barn-yard litter broadcast that I can get, and wish I had more. I shall plow under a good crop of red clover about every other year, and seed again the same year to clover, as I think it beneficial; I would do the same on all lands that I have yet tried. I do not let horses or cattle over one year old pasture in the orchard. I let calves and small pigs have access to the orchard, as they will eat up a great many wormy apples that drop, and help keep down the weeds. I think it advisable to pasture with young stock, and that it pays.

My apple trees are troubled with canker-worm, twig-borer, and leaf-crumpler. The codling-moth troubled my apples some last year. I have not tried spraying as yet. I have found borers in a few trees that were out in the grass near the fence. I pick my apples by hand; using step-ladders for the lower limbs, and longer ladders, wide at the bottom and very narrow at the top, for the upper limbs. While picking in the inside of a tree, I use a half-bushel sack made to hang on a limb, and so arranged that it can be let to the ground and emptied without getting out of the tree. I make three grades of my apples: First, good size, smooth, free from worms, and good calyx; second, apples under size, a little specked and wormy; third, culls. I have been sorting from the pile, but think I shall use a table made with the back end the higher, and the top made of heavy canvas without end, and passing over rollers at each end, so the apples can be brought in reach without handling them; then I would arrange my barrels so that the apples can be placed in them without bruising. I prefer the three-bushel barrel to ship in; but for handling I want a one-bushel box with handholes in the ends. I would pack the barrels as tight as possible, and then mark the name of variety, grade and name of grower on it. I would ship them by fast freight or express.

Sometimes I sell in the orchard. I have generally sold by retail and peddled, as I have a good set of customers. I can do as well to sell direct to the consumer

as to sell at wholesale. I sell second grade to any one that will buy. I feed the culls to cattle and hogs, and let the hens have all they want. I have had a market near home for all I have grown; may have to look further when all my trees bear. I have not tried distant markets. What I have tried took all the profits. I do not think it pays to dry apples, unless on an extensive scale. I store my apples for winter market in a dry cellar. I pack in both barrels and boxes while in the cellar; prefer boxes, as they are easier to handle and sort from. I have not been as successful as I would like, but think I have done as well as many apple-growers have with the number of trees I have. The Ben Davis, Winesap and Janet have kept the best for me. I have not tried artificial cold storage. If apples are held any length of time, I repack, so as to be sure they are up to grade. I do not lose over two per cent. In the fall apples sold at about thirty cents per bushel, and through the winter fifty to eighty cents per bushel. I employ careful men to pick and handle my fruit. I pay from fifteen dollars to eighteen dollars a month and board.

S. REYNOLDS, Lawrence, Douglas county: I have lived in Kansas forty-three years; have an apple orchard planted from two to forty years. I planted my first orchard in 1858, and, not knowing anything about what sorts would be suitable for Kansas, I had to rely entirely on what the Missouri nurserymen recommended. Among the sorts planted which proved failures were Yellow Bellflower, Fulton Strawberry, White Winter Pearmain, Baldwin, the Russets and some others. Winesap, Rawle's Janet, Dominic and White Bellflower all did fairly well. Of all the sorts the Winesap has been the most profitable. If I had planted that first orchard chiefly to Winesaps, the cash receipts would have been more than double. My later experience and observations prove that the Missouri Pippin is the most profitable apple to grow for the market, the Winesap and Ben Davis following next in order. For a family orchard, I prefer Early Harvest, Maiden's Blush, Jonathan, and Winesap. I prefer second bottom, with a rich soil and a porous subsoil. I prefer two-year-old, vigorous trees, set in rows two rods apart. Use a potato hook.

I consider the best plan of planting is to throw two furrows together, and plant on this double thickness of surface soil; the roots will luxuriate in this bed of fertile soil and with proper care the tree will make a vigorous growth. Plant early in the spring, before the buds start. I cultivate my orchard with a disc harrow followed by a common harrow, until they begin to bear; plant corn, potatoes or other hoed crop in a young orchard. Seed the bearing orchard to clover. Windbreaks are not essential in eastern Kansas. For rabbits I wrap the young trees; dig borers out. Pruning should be done at the time of planting. After that give the tree all the top it can grow. Never fear but the roots will keep pace with the top. Remember that every time you cut out a large limb you threaten the life of the tree. Give the tree plenty of room, so that the roots will not overreach each other. The moisture in the soil is only sufficient for one set of roots. About two rods apart is the proper distance. I prune with a knife to keep the limbs from crossing. I do not thin the fruit while on the trees, they usually thin themselves. My Ben Davis and Missouri Pippins are in mixed planting. I fertilize my orchard with stable litter; I think it beneficial, and would advise its use on all soils after the trees begin to bear. I pasture my orchard in the fall after the fruit is gathered, with horses. I cannot see any injury. I never let horned cattle in.

My trees are troubled with root aphid and roundhead borers. I do not spray. I find that all apples must be gathered before they are quite ripe if we want

them to keep well. In order to have them in the best condition for keeping they must be picked without bruises; I hand-pick mine in a sack over the shoulder. They must be kept perfectly cool and at an even temperature. This of course can be done by placing them in cold storage. I sort from a table in the orchard into two classes, large and medium. Pack in barrels, mark with grade, and haul to market. I sell apples in the orchard, generally wholesale them; sell the best to shippers. Sell the culls for cider. My best markets are west and north. I have tried distant markets, through agents, and found it paid. I do not dry any apples, but sell many low-grade apples to the evaporating factory. Do not store any; sell in the fall to shippers. Do not irrigate. Prices have been from one dollar per barrel up. Dried apples from four to six cents per pound. I employ young men at one dollar per day. The profits from a good apple orchard are more than those from any other crop which requires no more labor and expense. The profits from one good crop of apples are more than from three crops of wheat or corn; but apple-growing, as well as the growing of all other kinds of fruit, requires constant, patient labor and attention, in order to be successful, and even then the money will not come in with a great rush. In conclusion, I would say, that the business of growing fruit is much more certain of success than that of mercantile business. It has been ascertained from actual statistics that, of every 100 merchants, fifty utterly fail in business, forty are only moderately successful, and of the remaining ten only one will become rich.

W. J. GRIFFING, Manhattan, Kan.: Were that old fisherman, Izaak Walton, alive to-day, and an enthusiastic fruit-grower of eastern Kansas, he would probably express himself in the book he would write, "The Complete Horticulturist," that "doubtless God might have made a better apple country than this, but doubtless He never did." If there is a strip of land in the United States equal in size to the eastern third of Kansas able to grow as many and as fine apples as this particular strip, it has yet to be discovered. Our own experience in this line dates back just forty years. In 1858 the old family account-book shows the purchase by my father of three dollars' worth of apple trees (the number not given). This amount judiciously expended now would secure considerable nursery stock; but the same record shows the purchase, the month previous, of wheat at two dollars per bushel; sugar, six pounds for one dollar; flour, five dollars per hundredweight; so the number of trees obtained was probably not large. The following year, however (1859), seventy-one apple trees and some cherry trees were purchased, at a cost of \$17.75. These efforts to start an orchard were successful. The location was on the old homestead, about two and one-half miles east of what was at that time a frontier village called Topeka. The trees bore the first fruit in 1867. Other and more profitable orchards have been planted since then on the farm, but a few of the original plantation are still standing and bearing occasional crops of fruit (so my brother informs me).

On locating at Manhattan in 1870, the sod was broken, and the following year an orchard was planted; and we have planted trees more or less every year since. It has proven a source of pleasure and profit. After it commenced bearing I do not recall a year when the crop was an entire failure, and though we cannot now command two dollars per bushel, as we could for the apples from the Topeka orchard, yet they have paid well. The number of varieties we have tried is no less than seventy-five, not including seedlings. The following varieties I would unhesitatingly recommend as having proved profitable and more or less hardy. For early summer, Early Harvest and Red Astrachan; both are tender apples when fully ripe and will then not bear shipping well. I have found it best to

gather the ripest at least every other day and find buyers in the local market. The next to follow these, Chenango Strawberry, Maiden's Blush, and Pennsylvania Red Streak; the two latter are good shippers. The Pennsylvania Red Streaks are a decided success with me, and have paid nearly as well as my best winter sorts; don't fail to plant some of them. Next, I would recommend the following winter varieties in the order named: Winesap, Missouri Pippin, Ben Davis, Jonathan, and if you like a first-class sweet apple plant some Bentley Sweet, if you can obtain them. I have been obliged to top-graft some seedlings in order to perpetuate my own stock of them. I think it is also advisable to plant some Rawle's Janet trees. They are a late bloomer and will occasionally produce a crop when the other sorts have been injured by late freezing. In fact, they have the faculty of bearing in the "off" years, as we call them—years when the balance of the orchard is resting from previous labors.

Much has been said as to the proper location for an orchard—bottom land or hilltop, level ground or sloping. The fact is, with careful attention to the trees, any good, rich soil will answer. Anything that can in a measure ward off the evil effects of the fierce summer gales and the droughts of July, August and September will tend to minimize the losses. Were it possible for me to choose a piece of land exactly to my notions, I should select a river-bottom farm in the neck of some large "horseshoe," being where it would be possible for the trees to reach down their roots and draw moisture during the dry season by natural sub-irrigation. Marketing the crop is the last but not the least work of the apple-grower. In fact, when the orchard is well established, this is about the only work connected with the orchard. And in that respect the orchard has a decided advantage over other farm crops, that require yearly preparation of the soil, sowing, harrowing, cultivating, etc., as well as the harvesting of the crop. The early summer apples can usually be sold on the local market at fair prices; the later summer and fall can be shipped, and are usually in fair demand by Western buyers. Ship only your best; it will hardly pay to send any other grade. There is usually a good demand at this point for winter varieties by farmers from the West, who come in and buy their winter supply by the wagon-load. Occasionally, if the Eastern crop is short, buyers from Chicago will be on the ground. We do not believe in holding apples long in the hope of obtaining higher prices. Cold storage will solve this difficulty of the orchardist; we hope it will prove a success.

The most convenient thing to gather apples in from a tree or ladder that we have tried is a picking sack—a grain sack with a heavy wire or a stiff leather strap fastened around the mouth, and a broad strap connecting the top with the bottom of the sack. This can be carried over the shoulder with considerable comfort. There are always more or less inferior and unmarketable apples left after the best have been disposed of, and what to do with them is a question that confronts every great apple grower. For the last fourteen years we have been working this grade into vinegar. We found there was considerable to learn and care exercised to avoid losses. I will mention a few important things that are necessary to produce a good article of cider vinegar. First obtain good, iron-bound oak barrels—vinegar or whisky barrels preferred. Never use soft wood barrels of any kind. Paint them well with ocher before using; they will last longer. After filling with cider, keep in a shed until cool weather; then draw off and run into barrels in the cellar for winter, although, if well protected and not too full, they could remain out in the shed over winter. In the spring draw off again and run into other barrels; you will, in this, hasten the fermentation of vinegar and obtain an article free from sediment. It requires from one to two years for vinegar to cease working. Sell it then, and not before. Though it may

be very strong, it will not keep pickles unless the process is complete. Much of the vinegar sold on the markets as apple vinegar is made from corn, and now that corn has risen in price it is possible that the price of this kind of vinegar may rise also. It has not the quality or flavor of cider vinegar, but it can be manufactured so cheaply that it has hurt the market for a better article.

MAJ. FRANK HOLSINGER, Rosedale, Wyandotte county: Has resided in Kansas since March 7, 1867—thirty years; has 1500 apple trees from one to twenty-nine years planted, "big as a barn." Prefers Gano, Ben Davis, Missouri Pippin and York Imperial for commercial purposes, and Early Harvest, Cooper's Early White, Maiden's Blush and Jonathan added for family use. Says life is too short to tell how many varieties he has tried and discarded. Prefers a loose soil, and used to think hilltop best, but says there is no choice between bottom and hilltop, and that any particular slope is a delusion, as all are equal. Plants medium two-year-old trees, "usually roots downward—tops up." Cultivates with double-shovel plow and hoe up to seven years, planting with corn or potatoes. Then grows clover and weeds, "weeds mostly," ceasing to cultivate when it becomes inconvenient. Says windbreaks are unnecessary, and should only be made of the sun—"let her shine"—and does not understand how a rabbit can do a *mechanical* job of gnawing. Does not prune; he "trains"; leaves the pruning tools in the tool-house, and says it pays. Would thin apples on trees if labor did not come so high. His experience as to difference in fruitfulness between planting of one or of several kinds [together] is unsatisfactory. Believes fertilizers are good for trees if spread out, never if piled around the tree; would surely advise its use on all orchards. Would never allow an orchard pastured by any kind of live stock.

Has a large list of insects to contend against, but is not bothered with leaf eaters, hence does not spray, and does not believe any one has lessened the codling-moth by spraying. Uses common sense on borers, and digs them out. He first mounds the tree, and thereby gets what larvæ there may be deposited high up in the collar, few remain; these I dig out, which is all "simple enough." He describes gathering apples thus: "Pick 'em by hand; surround the apple with your fingers, break back gently, which loosens the stem, then lay gently in the basket. It is, very simple, the process." Makes two classes, one the best, the other of seconds. In the first we put all that seem perfect; in the second, all others that are not culls. Packs in barrels, well shaken down and pressed; marks with name of variety, and always rolls [?] them to market. Sells the best any way possible, peddles seconds, and lets the culls rot. His best market is Kansas City—three miles. Never dries any. Stores for winter in various ways. Has had varying success, and believes loss in cold store was owing to varying temperature and lack of proper care. Does not irrigate, but trusts in the Lord. Prices range from six dollars to ten dollars per barrel. For help he uses "men and mules," and pays as "little as possible, believing that is often too much."

JOHN E. SAMPLE, Beman, Morris county: Have been in Kansas twenty years; have 1000 trees planted twelve years, of Ben Davis, Rawle's Janet, Missouri Pippin, and Winesap; also Red and Sweet June, Early Harvest, and Maiden's Blush. Have discarded the Twenty-ounce Pippin as no good here. I have a deep, black loam with a clay subsoil, on upland, with southeast slope. I plant two-year-old trees a little deeper than they grow in the nursery, in rows thirty feet apart, and thirty feet in the rows, alternating the trees. I cultivate to corn and potatoes for about eight years, and then sow to red clover. I believe windbreaks

beneficial, and would make them of red cedar or Russian apricots planted on the west, south and east sides, thirty feet from the orchard. I feed the rabbits corn and clover; have no trouble with borers. I prune heavily, to make the apples large and keep down too much wood growth. I fertilize my trees with timber dirt, and think it pays. I believe it pays and is advisable to pasture orchards with hogs. I pick by hand, and sort into three classes: large, medium, small and blemished. Have not dried any. Store in the cellar, in crates two feet long, ten inches wide, and eight inches deep. Have sold at fifty to eighty cents per bushel.

E. K. WOLVERTON, Barnes, Washington county: I have resided in Kansas twenty-eight years; have an apple orchard of 18,500 trees from five to twenty-seven years old. For market I prefer Missouri Pippin and Ben Davis, and for family orchard would add Duchess of Oldenburg. Have tried and discarded Winesap and Rawle's Janet on account of shy bearing and poor keeping quality. I prefer a rich bottom with a porous subsoil, an east and north slope. I prefer good, thrifty, two-year-old trees. I plant by wire after the principle of check-row corn-planting; make the links twenty feet long, tie a white cloth in each link coupling, make the line long enough to plant ten trees (eleven links in length), stretch the chain east and west, say on north side of plat intended for planting; stick a stake at every tag. Draw another line ten trees south of it, and stick a stake at every tag, and so on to the south side of the plat. Then draw the line from the northeast stake to the east stake of the second row, the one due south, having the north tag at the stake. Then plant at every tag, placing the tree on east side of wire. When the row is planted move the wire west to the next stake, and so on till you reach the west side. The ground should first be prepared by plowing as for corn; float off [?] every evening all that you have plowed that day, which leaves the ground in the best condition.

I cultivate my orchard to corn for six to eight years. I plant twenty feet each way, and take an oak plant sixteen feet long, and place one section of a disc at each end of it, making it cut sixteen feet wide from outside to outside, and running within two feet of the trees at either end, leaving a space eight feet wide in the middle. Run another disc on that ground with another team and you have the space between the rows all clean of weeds if ground is in good condition when work is done. Cultivate both ways as often as necessary. I grow no crop in a bearing orchard. Windbreaks are not essential. For rabbits I tie coarse grass around the trees with label wire, and leave it on two years. I also use traps. I do not prune my trees; it is too injurious to the trees. I do not thin my apples while on the trees; it is too expensive. My trees are planted in blocks. I fertilize my orchard with stable litter; think it beneficial and would advise its use on all soils. I do not pasture my orchard. My apples are troubled with worms. I spray the first of May with London purple for canker and apple worms.

I pick in baskets and sacks. Sort into two classes: marketable and culls, using a sorting table. Sell my apples in the orchard to wagons from the West. I evaporate the second- and third-grade apples when the crop is large; make the culls into cider and vinegar. I tried distant markets for two years and found they paid. When apples are abundant we dry for market; use the same kind of driers as are used at Fairmount; sell them in sacks to the stores, and find a ready market for them; but it does not always pay. I do not store any for winter market if I can sell them in the fall. I do not irrigate. Prices have been in 1896, twenty-five cents per bushel; 1897, forty cents per bushel.

J. A. HEWITT, Hiawatha, Brown county: I have lived in Kansas thirty years, and have an orchard of 900 trees twenty-six years old. For commercial purposes I prefer the Ben Davis, Winesap, and Jonathan; and for family use would add Early Harvest, Maiden's Blush, and Grimes's Golden. Have tried and discarded some; very few varieties pay. I prefer high prairie. Have never grown any seedlings. I cultivate my orchard by planting to corn—raising no small grain—for a few years, then use the disc and harrow as long as the orchard lasts. I plant nothing in the bearing orchard, and cease cropping about eight years after setting. Windbreaks are essential to a growing orchard. I prune my trees a little every year to keep them in shape, and to let the sun in; I think it beneficial, and that it pays. Do not thin the fruit while on the trees, but think it would save time and pay well. I can see no difference whether trees are in blocks [of one kind] or mixed plantings. I do not fertilize my orchard, but am sure it would be beneficial, judging by some that have fertilized; I would advise it on all soils. No! no! no! no! I do not pasture my orchard; do not think it advisable; it does not pay. My apples are troubled with codling-moth. I do not spray. I sell my apples in the orchard at wholesale, yet sometimes retail them. I let my neighbors pick up the culls at ten cents per bushel. My best market is at home. I store apples successfully in bushel crates. I find the Winesap, Rawle's Janet, Ben Davis and Little Romanite keep best. I have to repack stored apples before marketing, losing about two per cent.

JAMES DUNLAP, Detroit, Dickinson county: Has lived in Kansas since October, 1871. Has an orchard of 1200 apple trees, 300 planted sixteen years, 700 planted eleven years, 200 planted six years. Considers Missouri Pippin, Winesap, Ben Davis and Jonathan best for market, and for family would add Red June, Early Harvest, Mammoth Black Twig, and Cooper's Early White. Have tried and discarded Yellow Transparent, Rambo, Fameuse, and others. Prefers bottom and eastern slope, sandy loam, with clay subsoil. Plants thrifty one-year-old trees in holes large enough to spread the roots out well, leaning the young trees slightly to the southwest. Cultivates both ways as close to the trees as possible, usually planting to corn until the orchard is about twelve years old; then pastures to calves in fore part of season, mowing off the grass and weeds later. Believes windbreaks very essential on north, west and south sides; uses Osage orange hedge and two rows of forest-trees, planting them seven feet apart and seven feet away from the apple trees, when orchard is started.

For protection from rabbits he uses a wash of lye and soft soap on the tree. In pruning he believes it pays to cut out sap sprouts, and balance up the tree. He fertilizes by placing stable litter around the trees in winter, and spreading it in the spring, and says it pays. Says it certainly pays and does no harm to pasture the old orchards with calves. He is troubled with canker-worm, flathead borer, tarnish plant-bug, fall web-worm, and leaf-crumpler, also with codling-moth. He sometimes sprays for codling-moth and canker-worm, and thinks he has reduced both of them materially. Cuts out borers and washes the tree with lye. Has tried kerosene oil on borers and says it did not seem to injure the trees. He picks in baskets, dumps in piles in the orchard, and covers with coarse hay. Sorts into two classes—sellers and cider apples. Uses barrels as a package. Makes cider vinegar and hog feed of culls, and sells his good apples in various ways; has sold in orchard. His best markets are the surrounding towns and the neighboring farmers. Never dries any, and only stores enough for winter use of family. Price in 1896 was seventy-five cents for best, fifty cents for seconds. Hires no help.

ROBERT MONTGOMERY, Troy, Doniphan county: Came to Kansas in 1857; served three years in the United States army, and have been here ever since. I have 4000 apple trees that have been set from twenty to thirty years. My market varieties are Ben Davis, Jonathan, and Missouri Pippin. For family use I added Yellow Transparent, Red June, Chenango Strawberry, White Winter Pearmain, Rawle's Janet, and Nelson's Sweet. I have discarded the Baldwin, Spitzenberg, Northern Spy, Early Harvest, and Early Pennock. Bottom land is not good; hills and hollows are best, with north or east slope; what we call mulatto soil is best. I prefer thrifty two- or three-year-old trees with low tops. Half of my trees are planted thirty feet each way. I now plant in rows two rods apart north and south and one rod apart in the row. I raise corn and potatoes among my trees for five or seven years, cultivating with the plow and the hoe; afterward I seed to clover; a disc can be used to good advantage every year: I keep the orchard in clover. Windbreaks are beneficial on high land, made of cottonwood, or better of cedar or Norway spruce, planted on the south side when you plant the orchard. I protect from rabbits with wooden protectors, leaving them on the year round. I cut the borers out with a knife, also use a wire. I shape the head of young trees by cutting out all the watersprouts with pruning shears and saw; old trees must be pruned or the apples will be small.

Barn-yard litter is beneficial on thin land, not necessary on rich land, but ashes are good on any soil. I pasture my orchard in summer with young horses and hogs. I think it advisable, as the hogs eat the apples that drop and destroy the worms. I have never sprayed. I pick in half-bushel baskets, and sacks with an iron hoop in the mouth; pour them in barrels and haul them to the barn, except those we wish to ship at once, which we sort in the orchard. I make two classes—good, sound, merchantable apples, and seconds. I have a culler that holds one barrel. I sort into a barrel, throwing the culls into another barrel, and I afterward sort the culls, for seconds; I pack in eleven-peck barrels, full and pressed solid, marked with the name of the variety written on the barrel. I sell the best at wholesale in barrels, the second grade by car-loads in bulk; the culls I give away, feed to hogs and cows, and make into cider. My best market is East and North. Have never shipped more than 500 or 600 miles away, and it paid. Have never dried any, and only store in barrels in my barn until I get a sale for them, never later than December. Price in the orchards in 1896 was seventy-five cents per barrel; in 1897, one dollar and a half. I use men for picking, at one dollar per day and their dinner.

F. W. DIXON, Holton, Jackson county: Has been in Kansas twenty-seven years; has an apple orchard of 6000 trees, set from three to twenty-five years. Grows and recommends for commercial orchard: Ben Davis, Missouri Pippin, Jonathan, Winesap, and Gano. For family orchard: Winesap, Ben Davis, Jonathan, Grimes's Golden Pippin, Maiden's Blush, and Rawle's Janet. Has tried and discarded Yellow Transparent, Early Harvest, Red June, Wagener, Willow Twig, Dominie, Roman Stem, Seek-no-further, Porter, Pound Sweet, Nyack Pippin, and Minkler, because they did not pay; some blighted and failed to bear. Prefer timber soil, or sandy loam with open clay subsoil; bottom land is good if it has not a hard-pan subsoil. Apples will not succeed well planted on ordinary sod, with impervious subsoil. Plant thrifty two-year-old trees, from four to six feet high, well branched. Cultivate as long as the tree lives; use turning plow in spring, and follow with harrow every week during summer until orchard comes into bearing; then get some tool that will stir the ground two to three inches deep, and cultivate often. Cultivation pays better than fertilizer or any-

thing else. He grows small fruit among the trees, but believes corn the best crop up to eight or nine years; then grows nothing. Does not think windbreaks essential, and would have none on the east or north; would not object to windbreak of Russian mulberry, or other hardy trees, on south and west. For rabbits, he wraps the trees, and keeps two good beagle hounds. Does not prune, except to keep watersprouts off, and cuts out limbs that cross. Thinks the wind thins the fruit sufficiently. Believes the best apples are self-pollenizers, and need no other varieties near, and that it does not pay to grow others. Never use any fertilizer. If orchard "runs out," would have another ready to take its place. Allows no stock in orchard. Is not troubled with insects. Has sprayed a little for tent-caterpillar. He digs out borers with a knife. His best market has been at home, selling by the bushel or wagon-load to farmers who do not grow any. Believes thorough cultivation better than irrigation. Prevailing prices, thirty-five to seventy-five cents per bushel. Uses male help, at one dollar per day without board.

S. H. DOMONEY, Aurora, Cloud county: Have been in Kansas ten years. Have an orchard of ——— trees, planted from twelve to fourteen years, of Ben Davis, Winesap and Missouri Pippin for market, and Red June, Duchess of Oldenburg, Cooper's Early White and Kansas Keeper for family use. I prefer limestone soil with gravelly subsoil, in the bottom, with north slope, if possible. Prefer trees two years old with low heads. "I like a tree with a tap-root." Plow deeply and plant in loose soil, thirty feet apart each way. I grow potatoes and sweet corn for six or seven years, after which I sow orchard-grass. The best tool for cultivating is a disc harrow. Growing no crop in the orchard. I think windbreaks are essential, and prefer Russian mulberry, three rows, planted six by eight feet apart. I like the mulberry best because they come into leaf early and hold their foliage late. I prune a little, to thin out and let the sun in. I believe it would pay to thin fruit on the trees. I use stable litter, and fertilizer from the hog-pen, and think it pays if not put too close to the tree. I tried pasturing with hogs, but don't think it advisable, as they destroy the trees to get apples. I spray some with London purple after the bloom falls, to destroy canker-worm and codling-moth, and think I have reduced the latter by such spraying. I dig borers out. We pick by hand, and sort into very best, second best, and culls. I sell at retail and to the grocers in Concordia, Kan. I make some cider, and feed culls to the hogs; never dried any; winter some in barrels and boxes, and find Ben Davis and Missouri Pippin the best keepers. I do not irrigate. Use no hired help. Prices have ranged from fifty cents in summer to eighty cents in winter.

H. L. FERRIS, Osage City, Osage county: A citizen of Kansas for twenty-one years. Have an orchard of 4000 apple trees—200 twenty years, 1800 seventeen years, 2000 sixteen years planted. Prefer, for commercial purposes, Ben Davis, Winesap, and Missouri Pippin; for family orchard: Winesap, Missouri Pippin, Jonathan, Romanite, and Maiden Blush; have discarded Rawle's Janet. Prefer good upland corn ground, with sand or gravel subsoil, north and east slope. I plow deep, and plant large two-year-old trees, shallow, and mound up; shorten roots and branches. Cultivate with plow and harrow from youth to old age. Grow corn in young orchard up to six years, afterward nothing. Prefer a windbreak on south, west, and north, of box-elders, Osage orange, or peach. Rub liver on trees to repel rabbits, and use a knife for borers. To prune with a little saw makes the trees grow faster, and the apples grow larger, and it pays. Use

stable and barn-yard litter to fertilize with, and it pays. Would not allow live stock to run in orchard. Am troubled with roundheaded borers and codling-moth. Spray in May and June for bitter rot and fungous diseases. Fight borers with a five-eighths chisel, a wire, and coal-tar. Pick from step-ladders into tin pails hung to branch with wire hook; haul in boxes on spring wagon to packing place. Sort on tables into three grades—first, second, and cider apples; pack into eleven- or twelve-peck barrels. Sell in all ways; have sold in orchard. Ship the best; best market in Texas. Send six-inch apples to where they are scarce; culls I sell cheaply at home, evaporate some, and make vinegar. Use a Zimmerman evaporator and Eureka parers. Sell dried fruit at retail, have shipped some; do not think it pays, do not find a ready market. Store for winter use in boxes in cellar successfully; find Romanite and Winesap keep best; lose about one-fourth. Have irrigated some from a pond with an eight-inch hose and steam-power pump. Average price has been fifty cents per bushel for apples and five cents a pound for dried apples. Use male help gathering, and female help at dryer, paying eight to ten cents per hour.

A. OBERNDORF, Centralia, Nemaha county: Have lived in Kansas nineteen years. Have an apple orchard of 4200 trees, from three to twenty years planted. I am told Ben Davis and Gano are the best apples for commercial purposes; for family use I would prefer Early Harvest, Red Astrachan, Duchess of Oldenburg, Maiden's Blush, Ben Davis, Winesap, and Rawle's Janet. I prefer hilltop with northern slope. I prefer one-year-old, switch-like trees, set 16x30 feet. I plant young orchards to corn, using double-shovel and diamond plow, and harrow; plant the bearing orchard to clover and cease cropping at five years. For rabbits I use paint during summer and wrap during winter. I also use paint for borers. I prune with shears and knife to secure an open center; do not think it beneficial. Never thin apples. I fertilize with barn-yard litter; it seems to benefit the trees and prolong their fruitfulness. Do not pasture my orchard. My old trees are affected with flathead borer and leaf-roller. The codling-moth trouble my apples. I sprayed three seasons; saw no benefit, so quit. I pick by hand, in a basket. I sort into three classes: First class, for market; second class, for immediate sale, and small ones, for cider. I usually sell at the nearest market. Best market is at home. Never dry any. I store for winter markets in cellar, in barrels, boxes, and in bulk, and am successful; find that the Winesap and Rawle's Janet keep best. We have to repack stored apples before marketing; sometimes lose more than at other times. Do not irrigate. Price has been fifty cents per bushel. I hire help at one dollar per day, or twenty dollars per month and board.

P. M. HOWARD, Clyde, Cloud county: I have lived in Kansas twenty-six years; have an apple orchard of 450 trees. For market purposes I prefer Ben Davis, Winesap, Missouri Pippin, Rawle's Janet, and Jonathan; and for family orchard Ben Davis, Winesap, Early Harvest, Maiden's Blush, Jonathan, and Wealthy. Would prefer a deep loam soil, clay subsoil, if not too close to the top, and almost level. I prefer two-year-old, low-head trees with no forks, planted in furrows. I cultivate my orchard to corn planted east and west as long as I can, using the plow and cultivator shallow; and cease cropping when the trees so shade the crop that there is no profit; I grow clover or weeds in a bearing orchard, and mow and leave on the ground for a mulch. Windbreaks are essential; I would make them of Osage orange planted in rows 2x4 or 2x6 feet. For rabbits I wrap the trees with corn-stalks, and for borers I mulch and keep the

trees growing. I prune my trees when planted; I think it beneficial. I never thin the fruit on the trees. I fertilize my orchard with anything of a coarse nature that is not easily disturbed; I would advise its use on all soils, unless very rich, deep clay soil; in such soil perhaps clean cultivation would be all that is necessary. I would add that my observations and experiences have taught me that the people of Kansas have lost millions of dollars from and through lack of knowing what we should have known. I think that the State Horticultural Society is doing a great and good work with *limited* appropriations. I have never seen any one yet who read the reports from the horticultural department but what was in full sympathy with your labors, but wondered why more reports were not sent out. I think our legislators should be more wise; consequently, more liberal in their appropriations for the work and distribution of the same, not only to the farmers, but to people in towns and cities; their needs are in proportion as great as the farmers'.

As to the fruit business: On the southeast quarter of section 26, township 4, range 1, is one of the *best* orchards I know of in Republic county (not the largest). It consists of about 450 apple trees, also peaches, cherries, pears, and grapes. Myself, little girls and wife planted it. I wish to tell you how every one of the different fruits have abundantly paid for labor and all cost, and left their owners a fair profit. The soil of this successful orchard is a black loam, upland prairie, clay subsoil; loam eighteen inches to two feet deep, previously cultivated in corn and potatoes, plowed, not listed. Lay of land: Two slight ridges; a wide draw; slope east and west. Trees more vigorous and bear as well in draw as on upland. Varieties: Ben Davis, Missouri Pippin, Jonathan, Winesap, Rawle's Janet, Maiden's Blush, mostly the first four. Planting: Distance, thirty by thirty feet, furrowed out with a fourteen-inch plow, running two furrows across each way. Cleaned out all loose dirt to make room for all roots to spread without turning up. The little girls held the trees, tops leaning to the southwest about five degrees. I covered the roots well, tramped firmly, and filled with loose earth. Leave furrows so as to hold water on upper side of tree. After all trees were out I gave each one a slight mulch of sorghum refuse. Cultivation: Crop always corn; rows running east and west. Rows far enough from trees so horses or single-trees would not touch them. Cultivate shallow, with one horse, and light plow with very short singletree. Pruned some. All limbs where cut off were painted. Cut close and smooth; wounds healed readily. Tried to prune so that air and sun would go through and not against the trees. Pinch off all water or tender sprouts.

To protect from rabbits and borers I stand corn-stalks running clear up to branches around body; tie at top and bottom; keep trees low, a little heavier on southwest side. I believe with thorough cultivation and stalk protection we would hear of less borers. All mulch was kept away from bodies of trees. I believe it all nonsense not to prune, but it should be done while they are young. My observation has been all my life that a well-balanced tree is longer lived, has more bushels of fruit, of better quality, smoother limbs and trunks. So I would say if you do not intend to protect the bodies of your young trees and prune do not buy or plant them; it does not do to sow oats, wheat, rye, millet or any grain crops in your orchard. It is an easy way to keep weeds down and a sure way to kill your orchard. It does not pay to pasture even with calves; chickens are at all times beneficial; hogs after your orchard has matured so the trees can resist the hog, when he rubs against them, which the hog is sure to do, and perhaps he will pull some of the lower limbs. I have never sprayed, but firmly believe it profitable. Next year I expect to plant out a new orchard and cultivate along

the line of the one I have told about, with such help as I can get from the horticultural department.

D. S. HAINES, Edwardsville, Wyandotte county: Has been in Kansas twenty-six years; has 3000 apple trees from two to twenty-five years old. Commercial varieties, Ben Davis, Missouri Pippin, Jonathan, and Willow Twig; and for family use, Early Harvest, Red Astrachan, Maiden's Blush, Jonathan, Grimes's Golden Pippin, Rawle's Janet, Celestia, and Winesap. Has tried and discarded Bellflower, Pennock, Baldwin, McAfee's Nonesuch and others for barrenness. Best location, hilltop, sandy loam with clay subsoil—any slope will do. Plants either in fall or spring, two-year-old thrifty trees, fifteen by thirty feet apart, a little deeper than they stood in the nursery. Grows corn, potatoes, cabbage, etc., well cultivated, among the trees, but not to crowd them, for five or six years. Uses a spading harrow where no crop is grown. After six years sows to clover. Needs no windbreaks in his section. Traps and shoots rabbits. Takes borers out with knife. Prunes very little; cuts out dead or broken limbs, as they are no good, and take up room. Never has thinned apples on the trees, but believes it would be all right. Sees no difference in fruitfulness if trees are in blocks of a kind or mixed up. Would use barn-yard litter, but not close to the trees; believes in it on all soils. Does not pasture, and thinks it would not pay. Is troubled with borers, tent-caterpillars, leaf-rollers, leaf-crumblers, and codling-moths. Never sprays. Picks in sacks. Packs in orchard, in twelve-peck barrels well pressed. Uses table for sorting (described elsewhere) and makes Nos. 1, 2 and 3 grades. Marks name of variety and own name on barrel head. Sells his best in car lots at wholesale, the culls to peddlers. Generally markets at Kansas City. Has tried distant markets and made it pay. Never dried any. Stores for winter in barrels in cold store; not always satisfactory; thinks the cold-storage business not yet fully understood; says Ben Davis and Jonathan keep best. Sometimes repacks, at a loss of one-tenth to one-sixth. Does not irrigate. Prices have ranged from two to five dollars per barrel. Paid last year one dollar per day to men who could do a good day's work.

E. M. GRAY, Perry, Jefferson county: I have lived in Kansas forty years; my orchard of twenty acres has been planted twenty years. For market, I prefer Ben Davis and Jonathan on poor land; and Missouri Pippin and Winesap on rich land. For family orchard, Early Harvest, Red June, Winesap, Grimes's Golden Pippin, Missouri Pippin, and Huntsman's Favorite. Have tried and discarded Grimes's Golden Pippin, Lawver, Winesap, Missouri Pippin, and Huntsman's Favorite; they are not profitable, are too small when grown on poor land. I prefer yellow clay bottom, with an east, south or northern aspect. I prefer large, healthy, two-year-old trees, planted with a lister, subsoil plow, and spade. I cultivate my orchard to corn, small fruit, potatoes and nursery stock seven years, with a cutaway disc harrow, and cease cropping after eight years; I plant nothing in a bearing orchard. Windbreaks are essential; would make them of Russian mulberry, Osage orange, or cedars, by planting two rows of them on the south and west sides of the orchard. For rabbits I keep a shot-gun and dogs. I do not prune; don't think it beneficial. I do not thin my apples while on the tree, but think it would pay. My trees are in mixed plantings; my Ben Davis are fuller and redder planted close by Jonathan and Winesap. I do not fertilize my orchard, but think it would be beneficial, and would advise its use on all exhausted soils in old orchards. Do not pasture my orchard; would not advise it, don't think it would pay. My trees are troubled with flathead borers, and my apples with curculio. I do not spray. I dig borers out with a knife.

Pick my apples by hand; have light-weight men climb the trees and pick in meal sacks, then lay on tables. Sort into two classes: First, perfect, well colored, smooth, and good size; second, wormy, fair, and small size. Pack in three-bushel barrels, well rounded up; mark the variety of apples on the barrel with a stencil; haul to market on a hay-frame wagon. I sell in the orchard, wholesale, retail, and peddle; sell the best to highest bidder; sell the culls to driers or ship South or West. My best markets are where apples are scarcest. Do not dry any; it does not pay. Don't store any; I have to repack stored apples before marketing, losing about one-twelfth of them. Do not irrigate. Prices have been from \$2 to \$2.75 per barrel; dried apples, five cents per pound. I employ men at seventy-five cents per day. Apple-growing in Kansas, on high prairie land, is not very profitable to the grower, unless he has a good windbreak on south and west sides of his orchard. In 1880 I planted twenty acres of apples trees of many varieties; Ben Davis and Jonathan were the only ones that paid me on high land. In 1895 I planted thirty acres to apples; fifteen acres on upland and fifteen acres on second bottom, sloping east and north. On the upland I put nothing but Ben Davis and Jonathan; on the bottom I planted Ben Davis, Missouri Pippin, Mammoth Black Twig, Gano, Winesap, and Jonathan—cross-fertilizing the Ben Davis every fifth row with the Mammoth Black Twig, Jonathan, and Winesap. I believe that cross-fertilization is beneficial to an orchard in making fruit more plentiful, larger, smoother, better color and quality. It is believed by many that Ben Davis, Jonathan and Winesap are self-fertilizers, and don't require crossing; that being the case, they should have the cross near by, in order to not decrease the species or run it out. Professor Darwin says self-fertilization is abhorrent to nature, and the same rule that applies to small fruits is equally applicable to apples. Why not?

Fruits and premium awards are my best advertisers. I have succeeded in carrying off most of the awards in every show I exhibited at, and have premiums on file to show for some. All my fruits are set for cross-fertilization, and I shall continue to set that way. Many have said and will say they see no difference; perhaps they are not close observers, and have given the subject little study. I have given the subject twenty-five years' study and experience, and think I am not mistaken. I think there is more money to be made on our high upland in pears, small fruits, and stone fruits. They pay me better than apples. The Grimes's Golden Pippin would be a good apple to grow if the trees did not die after two or three crops. The Lawver apples fail to hang on the trees. The Missouri Pippin will not stand up on our high land unless surrounded by windbreaks; they look here like a Kansas cyclone had passed through them—the limbs all blew off last fall. Winesaps fall off badly, and are affected with bitter rot. For trial purposes, I recommend Mammoth Black Twig, Gano, and York Imperial.

DR. J. STAYMAN, Leavenworth, Leavenworth county: We came to Kansas thirty-nine years ago, and traveling over the eastern portion of the state selected Leavenworth as the most desirable point to commence tree and fruit-growing. We were then engaged in that business in Illinois, and had collected over 1000 varieties of apples, which we brought to Kansas; among them were nearly all the leading varieties then grown and many new and rare kinds of local reputation. Our object in making this collection was to grow them side by side, under the same conditions, to ascertain their value. In 1860 we set an orchard of a few hundred trees, consisting of about seventy varieties, two years old. Among them were Ben Davis, Winesap, York Imperial, Willow Twig, Rambo, Rawle's Janet,

White Pippin, and Jonathan, and the leading apples generally grown, including summer and fall varieties. At the same time we set out about 1000 root grafts in a nursery. We then collected over 1000 more [scions] and top-grafted them [into standard trees], to get the fruit sooner. Over 1000 of these were received from the late Charles Downing. From this collection, and from specimens of fruit received, we have been able to accurately describe over 2200 varieties, with an outline cut of each, with seeds and core and all other characteristics. And to ascertain what effect climate had upon each variety, we kept an accurate meteorological record of the weather. This we furnished to the Smithsonian Institution, Washington, D. C., for ten years. We also grew the leading varieties on an elevation 400 feet higher, and on various aspects not over two miles apart, and learned what effect elevation and aspect had upon the bearing quality of different varieties.

For commercial orchard I prefer Stayman, Winesap, York Imperial, Jonathan, and White Pippin. It will be noticed that in the commercial list we omitted Ben Davis, Missouri Pippin, Gano, and Willow Twig. These varieties are all productive and profitable, but we believe the time has come (or soon will be) that the public will demand something better, and to meet this demand we have made the change; but to those who do not believe in progress the above varieties will prove at least productive, if not so profitable as in the past. In making out the list of apples we have hesitated somewhat in heading the list with Stayman, not from any doubt about the apple, but from the fact that it is not generally known; but this objection can be made against any apple when first introduced. The following is the description we gave twenty-one years ago in our fruit notes: "Fruit large, heavy, form oblate conic, regular; color greenish yellow; mostly covered, splashed and striped with dark red; flesh yellow, firm, fine, tender, juicy, rich, mild, aromatic, subacid; quality good to best; season January to May. Seedling of Winesap; bore the ninth year from the seed." After fruiting this apple over twenty years we can add the following: It is a strong grower, has a darker leaf, is a better bearer, hangs on the tree better, is of larger size, is of much better quality, and will keep better than Winesap. Charles Downing gave a similar description of this apple in his appendix. [Stayman Winesap.] R. J. Black, of Ohio, one of the best-posted pomologists, who has fruited it for years, puts it at the head of both the commercial and family lists, and says: "It has all the qualities of the Winesap without any of its faults." Prof. H. E. Van Deman, who has fruited it and seen it fruited in Delaware, puts it at the head of the list, and writes in respect to the change of name: "Stayman (apple) is worth almost a lifetime to produce." "Now, I have been so impressed with its coming value and popularity, that I have thought it ought to be shortened in name to *Stayman*." J. W. Kerr, of Delaware, says: "It is superior to its parent, the Winesap, in size, color, flavor, and keeping quality. The tree is more vigorous in growth. After several years' fruiting, I have no hesitation in saying it is the finest all-round winter apple that has come under my notice." Professor Heiges writes us about the same in substance. Prof G. H. Powell, of the Delaware Experiment Station, says: "In quality it equals the Northern Spy, and is in season from October to May." We could give many quotations of equal value from *Rural New Yorker*, *Green's Fruit Grower*, and *National Stockman and Farmer*.

Since writing the above we find the following in the last-named paper of May 26: "One variety, Stayman, mentioned frequently in these columns, a seedling raised by our correspondent, Dr. J. Stayman, of Kansas, from the old Winesap, receives special commendation. It is remarkable that, in the wide section of country between Kansas and Delaware, in Ohio, Indiana, Pennsylvania, and Mis-

souri, wherever this variety has been tried, it has developed the same excellences of size, quality, and keeping, as well as of vigor and productiveness. Lovers of choice apples will not fail to make a note of this." Winesap we place second on the list, after a fair trial of over thirty-five years side by side with Ben Davis. Give it good soil and high cultivation and but few apples will excel it. York Imperial we place third. It is not of the highest quality, but it is better than Ben Davis, and will keep in a common cellar, and command a high price. It is very productive in alternate years, and a hardy tree. Although we introduced this apple into the state thirty-eight years ago, yet its commercial value is scarcely known. Jonathan, perhaps, should stand at the head of the list for its great beauty, fine quality, and productiveness; but it matures so early, drops so badly, keeps so poorly, and requires so much care in handling, that we hesitate doing so. It is, however, a very profitable apple when well handled, and cannot be omitted, as no other in its season equals it. White Pippin: This apple of unknown origin and seldom mentioned should be better known, as it is far superior to the famous Newtown or Albemarle Pippin of the same type. We have had it in bearing on high and low land as long as any other apple, and find it very productive in alternate years, of the best quality, and bringing the best price. It keeps better, drops less, is of larger size, equal in quality, and will bring as high a price, where known, as the Jonathan. In a commercial orchard there should be few, if any, fall or summer varieties, unless favorably located; they should be of the best shipping and market varieties, as Early Ripe, Duchess of Oldenburg, Orange Pippin, Cooper's Early White, Jefferis, Muster, and Dr. Watson. These are all early bearers, very productive and salable, and of fine quality for table or kitchen. Those best for a family orchard are Stayman, Winesap, Jonathan, White Pippin, Mason's Orange, Summer Extra, Garretson's Early, Summer Pearmain, Early Joe, Jefferis, Early Ripe, Duchess of Oldenburg, Dr. Watson, Muster, and Wagener; and for sweet apples there are none better than Broadwell, Ramsdell, Superb, Baltzby, and Mountaineer.

All these apples are early bearers, productive, and fine for family use, and we cannot well discard any; but eight or ten trees, of summer and fall varieties together, are enough to supply the largest family. It is better, however, to plant one of each variety, that we may have a succession of fruit throughout the season; also, if one variety should fail, others might not. It would require a very long list to name all we have tried and discarded, but we will name some: Rawle's Janet we reject, as it runs too small and cracks badly; Ben Davis, Missouri Pippin, Willow Twig, Gano, Arkansas Black and Mammoth Black Twig are all productive, but of poor quality; Maiden's Blush, Lowell, Porter, Rome Beauty, Western Beauty, Fulton, Trenton Early, Cole's Quince, and many others, because they ripen too irregularly and drop too badly. The White Winter Pearmain, Lawver, McAfee and Kansas Keeper blight badly and are not sure bearers; Early Harvest and Red Astrachan are not hardy; Summer Rose, Early Strawberry and Benoni are fine, but too small; Primate, Chenango and Gulley of Pennsylvania are too tender to handle; Smith's Cider, Hay's Wine, Fallawater, Scott's Best and Nonpareil Russet are productive, but ripen early and are not profitable. Many Southern winter varieties are too small, such as Haley, Gully, Kittageskee, and Harris. Few if any Eastern winter apples are of any value here, as Northern Spy, Baldwin, Canada Red, Swaar, Sutton Beauty and Melon all ripen too early, and become poor, dry, fall apples. It is the same with all Northern apples, from whatever source or locality. It is a mistake to think we can find a winter apple adapted to Kansas that originated north of Kansas,

under a lower mean temperature. This we have fully demonstrated beyond the possibility of a doubt.

Early apples require a specific amount of heat to bring them to maturity from the time the fruit forms. If brought from a colder climate to a warmer one, you hasten its growth and accelerate its maturity just in proportion to the difference in mean temperature of the two localities, and consequently it ripens in the fall here. I prefer hilltop for quality, keeping, and color, and bottom for size. Hilltop and steep bluffs are the best for all kinds of winter apples, as they produce the richest fruit, with the finest color, and they keep the best and are not so subject to injurious pests. Fifty feet of abrupt elevation is equal in its effect to fifty miles of latitude south on frosty nights. It retards spring growth as much as forty miles north. An elevation of 400 feet makes a difference of from ten to twenty-five per cent. in the amount of saccharine matter in fruit, to which rich quality, fine flavor and aroma are due. Bottom land produces the largest apples, more murky in color and more irregular in bearing. Rolling, intermediate Kansas land will prove satisfactory. East and south slopes hasten the maturity of fruit, and are the best for early varieties; a northern slope retards the ripening of fruit and is the best for winter apples. The best specimens of apples we ever saw in Kansas grew on a northern bench about thirty feet below the top of an elevation of 400 feet, on good, rich, well-drained soil. They were large in size, clear in color, and perfect in form. We prefer any good soil that will produce a good corn crop, with a well-drained clay subsoil; mucky, wet or hard-pan soils are not fit for fruit. Land that produces a good crop of wheat is rich enough. We have seen a very heavy crop of York Imperial at its native home on quite thin freestone land. Almost any of the land in Leavenworth county is naturally rich enough if we only keep it so.

I prefer two-year-old untrimmed trees, set in furrows made with a two-horse plow, no deeper than we plant the trees, but wide enough to take in the roots. We set them about two inches deeper than they stood in the nursery, on the solid subsoil, and pack the dirt firmly amongst the roots; lean or set the heaviest top to the southwest. The largest and heaviest roots, if convenient, should be in the same direction. After filling the hole, bank up a steep mound of earth around the tree. If this is properly done no ordinary wind will ever move it. We prefer two-year-old or strong one-year-old trees, because they can be set more rapidly, cost less labor, less money, live better, and grow more stocky. We want them taken up with care, give no pruning whatever, neither "cut their tops in to balance the roots," when planting in orchard. Trees that are taken up when young and set out in an open orchard without pruning grow stronger and more stocky, bear sooner, and are less subject to blight, sun-scald, and the attack of flathead and roundhead borers. We have root-grafted as many as 500,000 in one season on sections of roots from two to six inches long with scions from three to twenty inches long, to see which were the best. Two-inch sections from one-year roots, grafted with scions about six inches long, set deep enough to form roots on the stock, are best. This "whole-root graft" is simply a *humbug*. It is the strength and vigor of seedling roots, not the length of them, that make the best-rooted trees. No sensible man will pretend to graft whole seedlings [roots] and set them out in a nursery. It cannot be done with success. We must cut off a portion of the root to do it. The question arises, how much? It is then not a whole root, and it becomes a question what length of root is best. It is not advisable to bud or graft seedling trees in the nursery, for all seedlings are not of the same vigor and hardiness; consequently the trees would differ similarly.

I plant my orchard to corn, potatoes, garden-truck, and small fruits, and keep this up, with clean cultivation, using a Planet jr. horse hoe, until they begin to bear, and cease cropping after ten years, planting nothing unless the above-mentioned crops or clover in a bearing orchard. Windbreaks are injurious unless planted at least 200 feet from the orchard. The best protection is to plant the two outer rows of fruit-trees close together; they can be cut out, if desired, when they become too thick. This is better than high-growing shelter trees or ever-greens. We want a free circulation of air to pass among the trees. A high and heavy protection produces an eddy which blights and sun-scalds the trees, as well as hastens the ripening and dropping of apples. We have had no occasion to use any protection from rabbits and borers since we quit pruning off the lower limbs. Pruning is not thoroughly understood. Trees are pruned to make them live, grow fast and stocky, and also slender; to make them bear young, give form, light and air, and to make them look alike; to bear heavy crops and fine specimens. It is claimed all this can be done by pruning; it can be accomplished without pruning in a much shorter time and without extra labor. We do not recommend pruning apple trees at any times excepting *after* the trees are well established in the orchard; then the lower limbs *may* be gradually removed to form the head, about two feet from the ground; but the longer we allow them to remain the heavier and stockier they become; for the body of the tree increases in size just in proportion to the amount of foliage on the lower limbs. We prune off dead, broken and sucker limbs, and have no objections to taking off limbs that chafe each other (if this should happen from neglect). We have lost more trees from pruning than from all other causes together. We have seen large orchards just in their prime that have been so injured from pruning that they never recovered. On the other hand, I have seen orchards that were so neglected, dilapidated and crowded that I thought a thorough pruning would make them more productive. I never thin the fruit on the trees; it is not necessary.

Pollination is no doubt an important factor in productiveness, size, quality, and form. We have had no opportunity to test the result with apples, as our varieties are all mixed up together. We would not plant in an orchard large blocks of any variety excessively; better have them intermixed with other varieties that bloom at the same time. The pollen of one variety may be congenial to some, while it may be neglected [repelled] by another; we will have to learn this by experience, or plant a less number of varieties together. We have little experience yet in planting large orchards of few kinds. Perhaps none of these varieties that are esteemed so highly are congenial to each other. We had better go slow about planting out 10,000 to 20,000 of one kind together. We may have gone too far now. We do not use any fertilizer for our trees only as we crop the land. The virgin soil of our county does not need fertilizing if planted in orchard until the tree comes into bearing, except we crop the land. It is, however, a mistake to think we can grow an orchard and crop the ground at the same time, without any injury to the orchard, unless we restore the lost fertility in some way. Orchards so exhaust the soil in about sixteen years' cropping that it is worth little afterwards. "It is estimated that an acre of apples in good bearing removes annually about forty-nine pounds of nitrogen, thirty-eight pounds of phosphoric acid, and seventy-two pounds of potash. If the fertility and productiveness of the orchard is to be kept up, these fertilizing elements must be returned in some form." At the market value of these fertilizing materials, it amounts annually to about twelve dollars an acre. It is estimated that an orchard will be in full bearing in about ten years. Then in six years of full bearing it will have exhausted the soil to the amount of seventy-two dollars per acre. Take in consideration

the previous cropping of ten years, need we wonder what is the matter with our orchard? Should we diminish the feed of a vigorous horse annually for ten years, do you think he could pull the same load, or be of much value? The nitrogen is the most expensive element, representing about half of the whole, yet it can be restored to the soil by crimson or red clover, peas, vetches, beans, cow-peas, or turnips, which have the ability of converting the free nitrogen of the air into available plant food. The best method of accomplishing this end is to grow these crops on the land and plow them under in their green state at about maturity. I do not pasture my orchard; it is not advisable and does not pay. My apples are troubled with codling-moth. I do not spray. For borers, I bank the trees, so that if they deposit their eggs they can be gotten out easily.

I pick my apples in baskets and sacks from a ladder, and sort them into three classes: first, second, and culls. I pack in baskets and barrels; press them in barrels, and mark with name of variety. I wholesale my apples in the orchard to dealers; market the best in baskets and barrels, sell my second and third grades the best way I can, and throw the culls away. My best market is at home. I never tried distant markets, and do not dry any. I am successful in storing apples for winter in boxes and barrels in a cellar, and find Ben Davis, Stayman, Willow Twig and York Imperial keep best. In storing apples for winter, they should be picked before they are too ripe and when the weather is not too hot; when picked they should be taken at once to shade and packed and stored away in the cool of the evening. They should be well sorted, packed in tight barrels, and headed up to exclude the light and air. They will keep longer if each apple is wrapped with paper. The temperature of your cave or cellar should be reduced as much as possible by throwing the doors open at night and closing them through the day. A gradual reduction and a regular temperature is better than a sudden change. Apples should not be hauled about in the hot sun before storing them away, neither should they be placed in cold storage at once. The change is too sudden. It is the same in taking them out of cold storage. It should not be done at once. A storing room for this purpose should be provided in every cold-storage plant. I do not have to repack stored apples if they are sold early, but if not until late we have to repack. The loss depends upon the variety. I have tried irrigation on a small scale, but do not irrigate now. Prices have been from fifty cents to two dollars per barrel. I employ men that are capable of packing apples, paying from five to ten cents per hour. We seldom hear anything about fall planting, as if it was a settled fact that the spring was the best or the only time it could be done successfully.

All of our trees for the last thirty-eight years have been transplanted in the fall, excepting the last three years they were set out in the spring. The difference is decidedly in favor of fall planting; they start in growth earlier and make a much stronger growth the first season, and there is a gain of nearly a year in size over those planted in the spring, and they certainly have lived better. Why should they not do better? We have more time and less hurry to do the work well, the ground is in better condition, the trees have more time to callus and become firmly established. It is often too wet to take the trees up and transplant them early, and late setting is not advisable. The distance trees should be set apart is a more important matter than is generally supposed. Very few ever think how large a tree will grow and the space it will occupy. Almost every thrifty variety will grow and spread, and require a foot of space each year; that would be ten feet in ten years and forty feet in forty years; in other words, the trees will meet in forty years if set forty feet apart. This holds good in Kansas; consequently, forty feet apart is too close to plant trees if we expect an orchard

to last that long. Apple trees will bear and be profitable for that length of time if they have sufficient space, receive proper care and cultivation, and the fertility of the soil is not allowed to become exhausted. Many set their trees 16x32 feet for the purpose of getting a large crop when the trees first come into bearing, with the intention of cutting out every other row when they crowd, but we fear very few if any ever think this will have to be done in fifteen years from the setting or the orchard would be ruined and the land very much impoverished. It would be much better and more profitable to set the trees 24x24 feet and cut every other row out in twenty-four years, at least one way, and if they crowded, both ways, and not crop the land at all, except to keep up the fertility of the soil. By this method we could have a good bearing orchard for forty years or longer, which would pay better than closer planting and cropping the land to pay the expenses.

DAVID BROWN, Richmond, Franklin county: Have lived in Kansas thirty-four years; have an orchard of 2000 trees, averaging twenty years planted, composed entirely of Ben Davis, Jonathan, and Winesap; have discarded everything else. I would plant on nothing but deep upland soil, planting good yearling trees. I grow no crop in the orchard, and cultivate thoroughly always with plow and harrow. I have quit pruning, as it kills the trees. Never pasture the orchard. I spray with London purple for the canker-worm and codling-moth. Borers I cut out. I always sell at wholesale to shippers at about eighty cents per barrel. Never dry any or store any for winter.

FRANCIS GOBLE, Leavenworth, Leavenworth county: Have been in Kansas over forty-three years. I have 13,000 apple trees, ranging in age from last spring's setting to forty years. For commercial purposes I use Ben Davis, Winesap, Jonathan, Missouri Pippin, Ingram, Maiden's Blush, Grimes's Golden Pippin, and Smith's Cider. For family use I would advise Jonathan, Winesap, Early Harvest, Rambo, and Milam. I have tried and discarded numerous varieties. I prefer medium to high land, with a clay and loam soil on a subsoil of clay and sand; any slope is better than southwest. I have planted trees of all ages, and all look well. I plant thirty-two feet east and west and sixteen feet north and south. I believe in thorough cultivation with plow, harrow, etc., as long as the orchard lives. Sometimes the orchard requires a certain kind of cultivation, at other times a different cultivation. In a young orchard I usually grow corn, potatoes, wheat, melons, or pumpkins. In a bearing orchard I usually grow nothing, though sometimes I take a crop of millet or pumpkins from the ground. I cease cropping entirely at from five to seven years. Windbreaks are not necessary here; they make their own windbreak if kept thoroughly cultivated and full of life. Thorough protection will largely prevent borers; if any are found in the tree I remove them with a knife and wire. For rabbits I wrap with paper or other material.

I prune with a saw to keep down surplus wood growth and improve the quality of the apples. It is beneficial if carefully done, a little every spring and not much at once. I believe thinning will pay when the trees are abnormally full. Remove as nearly as possible all defective fruit when half grown, and what is left will be of higher grade in size, color, and quality. I believe a decomposed stable fertilizer is necessary on some soils. Better not pasture with any stock whatever; I do not think it advisable; I think the profit (?) would be an expensive one. Am troubled somewhat with canker-worm, bud moth, borers, leaf-rollers, codling-moth, curculio, and gouger. I sprayed one year for insects generally with London purple

through the spring season, and do not think it was a success. I pick about as Judge Wellhouse does, and sort into three classes; the best we make firsts, the best half of the balance we call seconds, and the balance are simply culls. We pack in barrels and haul to market with wagons provided with racks holding sixteen barrels each. I sell my best apples at wholesale, but have never sold them in the orchard; the second grade I sell to groceries and peddlers; the culls I sell to anybody, usually in the orchard. I have never tried distant markets. I never dry any. I store for winter in a cold store built for the purpose on my own farm, which has been described in the paper. I have also tried artificial cold storage, and the Jonathans kept well. [See Cold Store.]

E. P. DIEHL, Olathe, Johnson county: I have lived in Kansas thirty years; have an apple orchard of 700 trees, twenty inches in diameter, twenty-nine years old. For market I prefer York Imperial, Jonathan, Winesap, and Ben. Davis, and for family orchard Early Harvest, Maiden's Blush, Winesap, and York Imperial. Have tried and discarded Bellflower, Dominie, Pennsylvania Red Streak, and White Winter Pearmain. I prefer hilltop with a mulatto limestone soil, northeast aspect. Would plant two-year-old trees, forty feet apart. I plant my orchard to corn and potatoes for five years, using a cultivator; cease cropping after six years; plant nothing in a bearing orchard. Windbreaks are essential; I would make them of trees, planted on the south, west, and north. I prune with a knife and saw; think it beneficial. I thin the fruit on my trees the latter part of May, and think it pays. My trees are in mixed plantings. I fertilize my orchard; think it beneficial and that it pays. Pasture my orchard very little, late in the fall, with horses; think it advisable and that it pays. My trees are troubled with canker-worm, tent-caterpillar, bud moth, root aphid, bagworm, flathead borer, roundhead borer, woolly aphid, twig-borer, and oyster-shell bark-louse; and my apples with codling-moth. I spray with London purple, using a force-pump, and think I have reduced the codling-moth. Those insects not affected by spraying I dig out with knife and wire. I hand-pick my apples from a step-ladder into a sack with a hoop in the mouth. Sort into three classes: first, second, and third; pack by hand in three-bushel barrel, mark with stencil, and ship by rail. I sell my apples in the orchard, wholesale and retail. Sell my best ones to apple dealers. Sell my second- and third-grade apples at the stores; make vinegar of the culls. I have dried apples with an American dryer with satisfaction; after dry, pack in barrels; we find a ready market for them and think it pays. I store apples for winter in bulk in a cave and am successful; I find York Imperial and Rawle's Janet keep best. We have to repack stored apples before marketing, losing about twenty per cent. of them. I do not irrigate. I get six cents per pound for dried apples. I employ men at \$1.25 per day.

In the growing of apples in Kansas many things are to be well considered. That injunction of Davy Crockett's must be kept constantly in view to be successful: "Be sure you're right, then go ahead." First, to select varieties that are well adapted to your soil; next, location; last but not least, the preparation of the soil and future care. Many of the varieties that are well adapted to the Eastern states are unprofitable here. Another great mistake is the planting of too many varieties. When I first came to this state thirty years ago, I consulted Col. A. S. Johnson, now of Topeka. From him I obtained a great deal of valuable information, he having had thirty-six years of Kansas experience. I should, no doubt, have planted many that I did not, owing to the information obtained of him; so it may be seen that, by proper care, experience, and observation, we may be of benefit to the rising generation. Having selected your varieties by

consulting the published fruit list of the Kansas State Horticultural Society, next select your location. Select, if you can, the highest northern slope; next east, next west. Put your ground in good order by plowing and subsoiling at least fifteen inches deep. Should there be any tenacious soil or spouty places, tile with four-inch tile, forty feet apart, three feet deep. A great mistake is made by many in planting too closely. I have trees twenty-eight years old, forty feet from tip to tip. Plant to some cultivated crop for six years, then seed to clover; trim your trees each February; keep the borers out, and if they do get into your trees hunt them out; spray your trees frequently at the proper time to prevent the noxious insects from getting the start of you, and when your trees commence to bear commence to fertilize by turning under clover and stable litter. Horace Greeley once said: "You might as well expect milk from a cow tied to a stake as apples from an orchard uncared for."

A. MUNGER, Hollis, Cloud county: I have lived in Kansas fifteen years; have an apple orchard of seventy-five trees twelve inches in diameter, eighteen feet high, seventeen years old. I prefer for market Ben Davis, Missouri Pippin, and, to a limited extent, Yellow Transparent and Grimes's Golden Pippin, and for a family orchard add Early Harvest and Maiden's Blush. Have tried and discarded the Willow Twig on account of blight and rot. I prefer bottom land, with a loose subsoil, and young and stocky trees. I plant my orchard to potatoes, beans and vines for ten years, and use a cultivator that keeps three inches very mellow, and cease cropping when impossible to cultivate. I grow weeds in the orchard and mow them. Windbreaks are not essential, but are very desirable; would make them of Osage orange, Russian mulberries, or box-elder. Set the first row four feet apart, the second six inches, and never trim; the third six feet. For rabbits I use traps and gun. I hunt the borers and encourage the birds. I prune my trees so as to give air and sunshine; think it pays. Do not thin the fruit while on the trees. My apples are in mixed plantings. I fertilize my orchard in the winter with stable litter fresh from the stable; it appears to do good, and would advise its use, with judgment, on all soils. I pasture my orchard with hogs and calves. I do not think it advisable among young trees. My trees are troubled with leaf-roller, and my fruit with codling-moth. I spray just after the blossom falls, with Paris green, for the codling-moth. Prices have been from 25 cents to \$1 per bushel. What the future of apple-growing in northern central Kansas may be, it is of course impossible to tell, but from the success of the few orchards that have been planted, and after being planted have received some attention besides that bestowed by calves and pigs, it would seem well worth a trial. There are years when the best attention possible cannot prevent damage and some loss from drought, especially on upland. For this reason bottom land would seem more suitable for an orchard in this county, even though subject to some disadvantages. In some orchards on low land only a few feet above the water-level, where a sandy subsoil admits of a free natural subirrigation, the thrift and productiveness of the trees have been unusually good. Cold seems to be dreaded less than hot, dry weather in the latter part of the summer, although late spring frosts sometimes do damage. Even the traditional "north slope" might have its advantages somewhat balanced in this county by the valley lands that retain a large amount of moisture.

A good soil with a loose subsoil that holds the greatest possible amount of water are the most important requirements as to location. If the cultivation is then such as to save the water of early summer rains to the best advantage until the dry weather of the late summer comes, it will be drawn upon, and some

very dry seasons may be tided over without much loss. Plowing in the spring and very frequent shallow cultivation afterwards are, as yet, the best known means to this end; and as a general rule they are sufficient to answer every purpose as far west as central Kansas, without artificial watering, as the average rainfall shows; but if the early rains are allowed to go to waste by falling on the hard ground and running directly off, or by rapid evaporation from an undisturbed surface, where capillary force is rapidly carrying back to the surface what has already soaked in, we invite ultimate failure when the drought comes. Cultivate once a week, or after each rain, when they come oftener than that, with something that will keep two or three inches of very fine, mellow earth on the surface, and will cause an amount of water to be retained in the soil below the earth mulch that will surprise any one who has never tried it. An ordinary harrow will do very well, or better a five-tooth cultivator, behind which I fasten a 2x4 scantling with large wire nails driven through it, about two inches apart, weighted on the back edge to keep it right side up; the scantling is cut as long as the width of the cultivator. At one operation the cultivator and this harrow leave the ground about like a hand-rake would, marked only by the footprints of the driver. Last summer this was used several times where young peach trees had been set out, going around each row and sometimes over the entire ground. There was no time during the summer that the trees stopped growing or showed signs of needing more moisture than they had. Nine hundred and ninety-four lived, the horses killed two, and the borers two more. Fifteen years ago I bought a small farm having on it a small family orchard of seventy-two apple trees. It included several varieties, from summer to winter sorts.

The trees were 28x28 feet apart, with peach trees alternating both ways, making three times as many peaches as apples in the orchard. The land was cultivated until the trees were ten years old, then sowed to timothy and clover. The timothy soon died out; but the clover lived for a few years, but is gone now. It happened that some of the years that it was not cultivated were some of the driest during the fifteen, and several trees died of blight. Would this have happened if the cultivation had been continued? I have gone to plowing and cultivating again, anyway, with no crop in the orchard. The trees are now fifteen or twenty feet high, and about twelve inches in diameter at the ground. The peach trees have mostly been cut out. Cannot see that they did any harm, unless it might have been harder on the apple trees during the dry season; but if it was, the peaches were worth about as much as the apples, and the trees make a quick, bushy growth, thus forming a shelter for the apple trees, which now stand straight and are well balanced. We have had a peach crop about half of the years. Potatoes, beans and vine crops were raised in the orchard the first few years. It was surrounded by a windbreak of cottonwood and box-elder trees, several rows, seven feet apart each way. This is certainly very beneficial; but Russian mulberries grow as well, make a thicker top, and at the same time invite birds to keep up their quarters there and make their homes with us, "a consummation devoutly to be wished." Osage orange, planted the same as for a hedge and never cut back, will make a better windbreak than cottonwood or box-elder, and a fence at the same time.

This orchard has borne variable crops, some good, some light, but always fruits. It is on bottom land sloping very slightly to the southeast; soil a sandy loam with a clay subsoil. It has been pruned considerably, but not very much at a time. One man in this county who succeeds well with apples never prunes, except to keep the center open to sun and air. Another near him gave his orchard a severe trimming a few years ago, and had no fruit, but some dead trees

for two or three years afterward. In planting, the ground should be well plowed, then mark off one way with a plow or lister. Twice to the row with the lister, with three or four horses, and the subsoiler well down, will make a very good preparation for small trees without much digging, and small trees are best for several reasons: they are cheaper, less work to set out, and more likely to live. Set stakes to go by, and, in planting, cross the furrows. We have just finished setting 2000 peach trees in this way, and very little digging was needed. Then cultivate well and often. Rub off shoots that start where limbs are not wanted, and start an evenly balanced top of four or five limbs. A year after the trees are set out, if any of them are leaning much, dig away the dirt on the side from which they lean, and set them up straight, tramping the dirt well on the opposite side.

With winter will come the rabbits, and they will girdle the trees if not prevented. Many and varied are the sure cures for them, but none are perfect. A wash of ordinary whitewash and a pint of sulphur to the bucketful, applied with a brush or swab to the bodies of the trees, generally stops their work, but if the rain washes it off it must be put on again or they will resume operations. A little coal-oil added to the whitewash prevents the rain from having so much effect on it; make it thin, so it will not scale off so badly. Two applications have been enough for our young trees the past winter. We also use traps which are very similar to the Wellhouse traps, described in the Kansas State Horticultural Report for 1897. Tarred paper, corn-stalks, veneering, screen wire, cloth tied around the trees, or a woven-wire fence around the entire orchard, are all among the practical means used to fence against rabbits; but don't try the plan of one of my neighbors, unless you have too many trees; he applied coal-tar; it kept the rabbits off, and his orchard is now a treeless corn-field.

During winter we haul manure direct from the stable and spread under the trees (not against them) out as far as the ends of the limbs. On good ground I would not do much of this until the trees get to bearing, as it would interfere somewhat with cultivation and would not be needed, but when a good annual crop is taken from the orchard something must be returned, or the supply is going to run out. On thin land rotten manure applied when the trees are small will do them good. Pasturing an orchard at any time is of doubtful expediency; it is safer not to. I have sprayed but once. That was done just after the blossoms fell, and again ten days later. There were fewer wormy apples than usual. That was last year. Think I will try it further.

For a home orchard Early Harvest, Yellow Transparent, Maiden's Blush, Grimes's Golden Pippin, Winesap, Missouri Pippin and Ben Davis do well here and keep up a supply from first to last. For commercial planting Ben Davis is perhaps best here as elsewhere. Missouri Pippin does well; Winesap bears enormously, but is too small, and gets smaller as the trees get older. There is a good local demand here for Grimes's Golden Pippin and a few of any very early variety. Willow Twig has been worthless on account of blight and rot. Encourage birds by every means, and never let one, or a nest, be disturbed, unless it is that belligerent little alien, the English sparrow. They are at war with all the feathered tribe, even with their own relations, and should be exterminated. Don't begrudge birds a few feeds of cherries and berries, when they work for nothing and board themselves nearly all the year.

A. H. BUCKMAN, Topeka, Shawnee county: I have lived in Kansas twenty-eight years; have an apple-orchard of 1000 trees two to twenty-six years old. For market I prefer Maiden's Blush, Jonathan, Winesap, Ben Davis, Missouri Pippin, and Huntsman's Favorite; and for a family orchard White Juneating

(the earliest apple known), Red June, Early Ripe, Duchess of Oldenburg, Sweet June, Fulton Strawberry, Cooper's Early White, Smokehouse, Maiden's Blush, Grimes's Golden Pippin, Jonathan, Winesap, Rawle's Janet, Ben Davis, Ramsdell Sweet, Roman Stem, and Red Romanite. I have tried and discarded King, on account of rot, falls early, water core, short-lived; Kansas Keeper, on account of blight, poor tree; Yellow Bellflower, on account of being a shy bearer and rot; Willow Twig, on account of blight; Lansingburg, on account of blight when the tree is young; R. I. Greening, on account of its falling early, and rot. Baldwin, falls early and rots. Lawver, no good on my soil. McAfee's Nonsuch, poor bearer. Rambo, not acclimated. Northern Spy, rots. Pryor's Red, ripens unevenly, and is affected with scab. Dominie, there are many better of its season. Esopus Spitzenburg, rots badly. Rome Beauty, good some seasons. Ohio Nonpareil, poor bearer, falls before ripe. Lowell, blights while trees are young. Winter Swaar, rots before perfectly ripe. Autumn Swaar, good of its season, and should have a place in the family orchard. York Imperial, poor quality; rots too bad for commercial purposes. American Summer Pearmain, shy bearer while young. White Winter Pearmain, is affected with scab and is no good. Red Winter Pearmain, falls off early; the tree is poor. Gilliflowers, black and red, rot badly. Pennsylvania Red Streak, affected with scab; very good some seasons; trees die early. Sweet Bough, trees die early. Bentley Sweet, keeps all right, moderate bearer; tree appears to be tender. Clayton, rots and is no good. Calvert is a poor bearer and rots with me. Pound Pippin, no value. Iowa Blush, no value, small. Red Vandervere, no value; rots. Vandervere Pippin, moderate bearer and rots. Pennock Summer, good market in its season. Pennock, fairly good; we have plenty better. Early Harvest is affected with scab some seasons. Early Ripe is better and larger and to be preferred. Smith's Cider, blight, poor tree. Red Astrachan, poor bearer. Roxbury Russet, all russets fail with me. Jefferis, quality fine, but will not bear. Ortley, good, but is inclined to rot.

I prefer hilltop having a drift soil, but the subsoil is of more importance than the surface soil. I prefer a north or northeast aspect. I prefer two-year-old, medium-sized trees, clear of root aphid, set in a dead furrow, with peach trees between north and south. I cultivate my trees six years after planting, with a plow and five-tooth one-horse cultivator. Plant the young orchard to corn; cease cropping after six or seven years, and then seed down to clover. Windbreaks are essential; would make them by planting one to six rows of Osage orange, red cedar or catalpas all around the orchard. The boys hunt the rabbits with shot-guns. I wash the trees with a carbolic-acid wash for borers. I prune with a knife and saw to balance the top, keep down watersprouts, and to get rid of useless wood. I think it pays and is beneficial, as it shades the body of the tree and keeps off the flathead borers. I do not thin the fruit. Can see no difference whether trees are in blocks of one variety, or mixed plantings. I fertilize my orchard with stable litter all over the ground, and wood ashes around the trees, but do not believe it pays, and would not advise it on all soils; any soil that is suitable for an orchard will not need enriching until after it ceases to be profitable. I pasture my orchard with hogs and calves; I think it advisable under certain conditions, and find it pays. My trees are troubled with root aphid, round-head borers and buffalo tree-crickets; and my apples with codling-moth. I do not spray. I pick my apples by hand, from a ladder, into a sack with a strap over the shoulder. I sell the bulk of my apples in the orchard, from piles, at wholesale and retail; sell the grocers and fruit dealers what are left of my best apples. Make cider of the second and third grades of apples. Feed the culls to

the hogs. My best market is in Topeka. Never tried distant markets. Do not dry any. I store some apples for winter in bulk, in boxes and in barrels in a cellar. I have to repack stored apples before marketing. Apples have been about forty cents a bushel in the orchard for the last ten years.

E. HIGGINS, Seabrook, Shawnee county: I have lived in Kansas twenty-six years; have an apple orchard of 250 trees twenty-five years old. For market I prefer Winesap, Jonathan, Maiden's Blush, Smith's Cider, and Ben Davis; for family orchard, Winesap, Jonathan, Maiden's Blush, Red June, and Grimes's Golden Pippin. Have tried and discarded Kansas Keeper on account of blight. I prefer hilltop; best below lime rock, with a northeast slope. I prefer two-year-old, low-headed trees, set thirty feet each way. I plant to corn for four years, then cease cropping, and seed to clover. I have a windbreak on the south side made of Osage orange, to keep the hot winds off. I prune lightly to thin out some of the middle branches; I think it pays. I do not thin my fruit. I fertilize my orchard with stable litter, and plow it under. I think it beneficial, and would advise its use on all soils. I sow my orchard to oats, and pasture with hogs with rings in their noses; they live on the oats, and do n't hurt the trees, but with the help of the chickens they keep the canker-worms off. My trees are troubled with round- and flathead borers. I do not spray. I hand-pick my apples; sort into two classes—shipping and cider. I sell my apples in the home market; sell second and third grades to the cider-mills. Never tried distant markets. I do not dry any. I am successful in storing apples in bulk in a cellar; find Winesap to keep best. Prices have been from fifty to sixty cents per bushel. I employ young men at seventeen dollars per month.

J. C. BECKLEY, Spring Hill, Johnson county: I have lived in the state thirty years; have an apple orchard of 130 trees, twenty-eight years old and large for their age. For a commercial orchard I prefer Ben Davis, Jonathan, and Missouri Pippin; and for family use Early Harvest, Maiden's Blush, Jonathan, and Winesap. I have tried and discarded Smith's Cider, Talman (Sweet), Rambo, Fameuse, Willow Twig, White Winter Pearmain, Roman Stem, Dominie, Fallawater, Wagener, Baldwin, and White Pippin, because they mature too soon, fall off and rot long before it is time to pick them. I prefer hilltop with a dark mulatto soil and a clay-subsoil, with a western aspect. I prefer two-year-old trees, with plenty of fibrous roots, and a well-developed top, set forty by forty feet. I cultivate my orchard till it is six or seven years old with a common plow and harrow. In a young orchard I plant potatoes, corn, pumpkins, melons, and garden-truck; I cease cropping after eight or nine years, and seed bearing orchard to clover. Windbreaks are not essential, unless on the south and north sides; would make them of cedar or evergreens. I would not make a windbreak at all. For rabbits I wrap the trees. When hunting borers I take knife and chisel and pare all gumand dirt off of the roots; then I cut wherever I see signs of a borer until I get him, and if he has gone too deep to cut out I take a No. 20 wire six or eight inches long, bend a very small hook on one end, and run it up in the hole he has made, and ninety-nine times out of 100 pull him out. When done put some alkali of some kind around the tree, such as lime, ashes, or soft soap; then cover up.

I prune with a saw or knife, cutting out the crossed limbs and shaping the top. I think it pays while the trees are young. I never thin the fruit while on the trees. My trees are in mixed plantings. I fertilize my orchard with stable and hog manure: I think it very beneficial, and advise its use on all soils,

especially on old orchards. I pasture my orchard with hogs, and think it advisable at times. It pays. My trees are troubled with canker-worms, roundhead borers, and leaf rollers, and my apples with codling-moths. I have never sprayed, but intend to this spring, in April and May. I am going to use a dust sprayer with London purple and paris green for canker-worm. I pick my apples by hand from a ladder into a sack, sort into two classes by hand, pack in a two-bushel crate, fill full, with blossom end up, mark with the grade, and ship to market-place by freight. I retail apples in the orchard; sell my best ones in crates; feed the culls to hogs. Best market is at home; never tried distant markets. We sun-dry some apples for home use, then heat on the stove and put into paper sacks. I am quite successful in storing apples in bulk, boxes and barrels in a cellar. Ben Davis, Winesap and Little Romanite keep best. Sometimes I have to repack stored apples before marketing, losing about one per cent. of them. Prices have been about sixty cents per bushel, and dried apples five to six cents; evaporated apples, seven to eight cents.

ALBERT PERRY, Troy, Doniphan county: Have lived in Kansas forty-one years; have an apple orchard of 5000 trees, planted from five to twenty-four years. I grow for commercial purposes, first, Jonathan; second, Ben Davis, York Imperial, and Mammoth Black Twig. Ten years hence those who now plant Ben Davis will probably regret it. [?] There is a growing demand for a better eating apple. I now plant Jonathans and York Imperial. The latter is a good bearer, and a vigorous tree, however aged. For family orchard, I would advise adding to these Rambo and Fall Strawberry [Chenango]. I have tried and discarded many others. Prefer bottom, loess formation, near Missouri river. No slope has any advantage over another. Cultivate with plow and harrow, growing corn as an orchard crop for five years; then seed to clover and blue grass only. Do not care for windbreaks. Where there are windbreaks apples on trees do not get sufficient air. I protect from rabbits by tying corn-stalks about young trees. Prune some. I believe all apple blossoms are self-pollinating, and there is no advantage in mixed plantings. Need no fertilizers but clover in my locality. Believe it pays to pasture the orchard with horses in the winter; if you have a stack of hay for them to go to they will not harm the trees. Am troubled with codling-moth and apple curculio. Spray for codling-moth ten days after the apple is formed, and believe I have reduced their number. I use the knife for borers. Pick in baskets; deliver to packers in orchard. The aphid appears to do no particular injury to tree or fruit. Burn fall web-worm with a coal-oil torch. Sort into number one, fancy, number two, fair but defective in shape, color, or otherwise, and culls. Pack in three-bushel barrels, pressed so they will not shake. Sell firsts in orchard; sell seconds in car lots in bulk; sell culls in bulk for cider or vinegar. My best market is in the orchard. Have tried consigning to distant markets, but it did not pay. Have stored second grades for winter in boxes and barrels and in bulk, and made it pay. Ben Davis, Winesap and Rawle's Janet kept best. We sort and lose about one-fifth of the second grade only. Prices have run from \$1 to \$1.50 per barrel, of late years, in the orchard. For help in care of orchard I use men. In picking season I use all kinds of help. No experts. Pay from \$1 to \$1.50 per day.

J. H. ROACH, Lowemont, Leavenworth county: Have been in Kansas forty-two years. Have an apple orchard of 5500 trees; 800 planted thirty years, 1200 planted thirteen years, and 3500 planted three years. For commercial purposes I prefer Jonathan, Ben Davis, Missouri Pippin, Winesap, and Willow Twig. For

family use I prefer Jonathan, Huntsman's Favorite, and Winesap. I have discarded Yellow Bellflower, Rawle's Janet, and Russets. I prefer black loam with red gravel subsoil, hilltop with extreme north slope, no matter how steep. I plant thrifty two-year-old trees, thirty-three feet apart each way, except Missouri Pippin, which may be closer. Cultivate up to twelve years of age; grow corn until seven, then clover two years; then corn one year, after that clover with a little timothy, to keep the weeds down. I cease cropping the clover when the orchard is from twelve to fourteen years old. I consider windbreaks harmful. Any good axle grease or "dope" will keep off rabbits. I trim until five years old with a pocket-knife, to give shape and stout branches. I believe fertilizers are beneficial, put on every second or third year. I pasture my bearing orchard with horses and cattle after the fruit is gathered until the 1st of January; think it is advisable and a benefit; allow no hogs in at any time. Am bothered some with borers and codling-moth. Have never tried spraying, but would advise it. We pick in sacks fastened over the shoulder with a snap and ring. Usually sell in the orchard. Have tried artificial cold storage satisfactorily, and think it the most reasonable plan. Prices have ranged from \$1 to \$1.50 per barrel, for firsts and seconds, in the orchard. I employ men at seventy cents per day.

A. D. ARNOLD, Longford, Clay county: Have lived in Kansas twenty years. Have 300 apple trees, sixteen years planted, from ten to fifteen inches in diameter. Grow only Ben Davis, Winesap, and Missouri Pippin for all purposes. I prefer bottom land in this locality, sandy loam with a northern aspect. Plant two-year, stocky trees, with a low top. I cultivate with the plow and disc, and grow no crop in the orchard. I believe a windbreak of box-elder or evergreens is beneficial but not essential. I prune very little, using my knife with judgment. I use stable litter as a mulch, and think it pays. I never pasture my orchard. Have few insects but codling-moth. I shade the body of the tree to keep borers out, and dig them out if any get in. I use ladders, and pick into baskets, and sort into two classes—perfect and imperfect. My trees have never borne a full crop, only enough for home use and the neighbors. We have had several dry seasons, causing the fruit to fall badly.

J. S. GAYLORD, Muscotah, Atchison county: Have lived in Kansas twenty-six years; have 5000 apple trees, planted from one to twelve years. For market I prefer Missouri Pippin, Ben Davis, Winesap, and York Imperial, and for family would add Yellow Transparent, Cooper's Early White, Maiden's Blush, Grimes's Golden Pippin, Jonathan, Rawle's Janet, and Little Romanite. I prefer hilltop with eastern slope, and would plant only two-year-old trees. I have grown both seedlings for stock and root grafts, in the nursery. I believe in thorough cultivation with two-horse cultivator and double-shovel plow, using a five-tooth cultivator near the trees. I crop with corn from seven to nine years, and then sow to clover. I do not think windbreaks essential. For rabbits and to prevent borers I use equal parts of carbolic acid and water as a wash. I prune a little by cutting back on the north side and keeping out the watersprouts, which I think pays. I think it pays to thin apples by hand in July and August. I have used some stable litter in the orchard, and think it pays. I pasture horses in my orchard during winter, but no stock at any other time. I spray, after blossoms fall, three times, two weeks apart, with Paris green, for the codling-moth, and my apples are quite free from worms. I dig out borers and pick off worm nests. I pick by hand in half-bushel baskets, sell at wholesale, and the buyer sorts to suit himself. I have never dried or stored any. Prices in 1896 and 1897,

seventy-five cents per barrel; spring of 1898, \$1.25 to \$1.65. I use laborers at one dollar per day.

ALEX. SPIERS, Linn, Washington county: Have lived in Kansas twenty-eight years. For commercial orchard I prefer Jonathan, Cooper's Early White, Ben Davis, Missouri Pippin, Rawle's Janet, Dominie, Winesap; and for family orchard Jonathan, Winesap, Cooper's Early White, and Ben Davis. Have tried and discarded Yellow Bellflower on account of shy bearing. I prefer rolling upland, black, sandy loam with porous subsoil, and a southeast slope. I prefer two-year-old trees; have tried root grafts and seedlings with good success. I cultivate with a diamond plow up to bearing age. Windbreaks are essential, and I would make them of ash, box-elder, maple, and elm; I would plant either the young trees or seed. I prune with a saw, and use a chisel on watersprouts. I think it beneficial. I thin by shaking the tree when the fruit is small. I fertilize; think it benefits the trees, by making them grow stronger, and they fruit better; think it advisable on all soils. I pasture my orchard with hogs, but would not advise it; does not pay. Flathead borer and fall web-worm affect my trees. I spray, as soon as the bloom falls, with London purple. I sometimes sell my apples in the orchard, and sometimes from the cellar. I store apples in the cellar, and am successful. I do not irrigate. Prices have been from twenty-five cents to one dollar per bushel.

THEO. BEDKER, Linn, Washington county: I have lived in Kansas thirty years: have an apple orchard of 100 trees from two to twelve years old. For market I prefer Ben Davis, and for a family orchard Winesap. I prefer bottom land with a sandy loam and a northeast aspect. I plant my trees in squares thirty feet apart. I cultivate my orchard for three years with a single-horse cultivator. Plant corn and potatoes in a young orchard; cease cropping after four years; plant timothy and clover mixed in bearing orchard. Windbreaks are essential; would make them of willows, by planting on north and south sides of the orchard. For rabbits I wrap the trees with corn-stalks in the winter, and dig the borers out. I prune my trees with a saw to make thinner; I think it beneficial, and that it pays. I do not thin the fruit while on the trees. I do not think it would pay. I fertilize my orchard with slaked lime, and would advise it on all soils. It helps to keep off borers. I do not pasture my orchard; do not think it advisable. My apple trees are troubled with bud moth, twig-borer, and leaf-crumpler, and my apples with curculio. I have sprayed when in bloom with London purple, but do not think I have reduced the codling-moth. I pick my apples by hand, and sort into two classes—good keepers and cider apples. Put them all in one pile and then sort. I prefer barrels or boxes, from three to twenty bushels; fill them full. I retail my apples. I sell the best in sacks by the bushel. Make cider for vinegar of the culls. Never tried distant markets. I dry some for home use in the sun; this is satisfactory. I am successful in storing apples in boxes and barrels in the cellar. I find the Rawle's Janet and Winesap keep best. I never tried artificial cold storage; I lose about one-twentieth of my stored apples. I do not irrigate. Prices have been from thirty-five to fifty cents per bushel.

JOHN FULCOMER, Belleville, Republic county: Have lived in Kansas twenty-seven years; have raised for market Ben Davis, Winesap, and Jonathan; would prefer for family orchard Early Harvest, Red June, Duchess of Oldenburg, Cooper's Early White, Smith's Cider, Minkler, Missouri Pippin, Winesap, Ben Davis,

Golden Sweet, and Maiden's Blush. Have tried and discarded about all varieties excepting the above named on account of being tender and unprofitable. I prefer bottom land, limestone soil with a gravel subsoil, and a northeast or eastern slope. I prefer for planting strong, stocky yearlings—never over two years old—set at the crossing of furrows plowed with a lister. I cultivate my orchard to potatoes, pumpkins, squashes, melons, or any low hoed crop. I use an ordinary ten- or twelve-inch plow, and a five-tooth cultivator, and keep this up until they begin to bear; then seed to clover, mow it, and let it rot on the ground; then let the clover seed fall under, harrow, and let come up again. Windbreaks are beneficial; would make them of ash and Osage orange, by planting a few rows of trees inside of the hedge. To protect against rabbits, I wrap the trees. I prune with a saw and knife to remove chafing and dead limbs, and to make the tree more healthy and vigorous. I think it beneficial. I never thin the fruit on the trees. I fertilize my orchard with coal and wood ashes; think it beneficial, and would advise their use on all soils. I do not pasture my orchard. My trees are troubled with canker-worm, and my apples with codling-moth. I never have sprayed to any extent. I hand-pick my apples, in one-half bushel splint baskets; sort into two classes as soon as picked.

LOW. MILLER, Perry, Jefferson county: Have lived in Kansas thirty years. Have an apple orchard of 2400 trees from one to fifteen years old. For commercial purposes I prefer Jonathan, Missouri Pippin, and Ben Davis, and for family orchard Early Harvest, Red Winter Pearmain, Cooper's Early White, and Rambo. I prefer bottom land, clay soil and a porous subsoil, with a north and east slope. I prefer two-year-old, low-headed, stocky trees, planted twenty-five by thirty feet. I cultivate my orchard to corn for six years, using a plow, cultivator, and harrow, and cease cropping after six or seven years. Grow only weeds in a bearing orchard. Windbreaks are essential; would make them of maples, planted two rods apart around orchard, For rabbits I keep two hounds and a shot-gun. I get after the borers with a knife. I prune with a knife to keep out watersprouts. Never have thinned fruit on the trees. I fertilize my orchard with stable litter, and think it has proven beneficial, but would not advise its use on all soils. I pasture my orchard with horses, but would not advise it. I doubt if it pays. My trees are troubled with borers, and my apples with codling-moth. I do not spray. Pick my apples by hand into sacks. I sort into three classes—first, second, and culls—into baskets from the ground. I sell apples in the orchard at wholesale. I market my best apples in barrels; sell second and third grades to vinegar and cider-mills. My best market is at home. Never tried distant markets. Do not dry any. I store some apples in bulk in a cellar, and am successful. Ben Davis and Missouri Pippin keep best. Prices have been seventy-five cents to \$1.50 per barrel. I employ men and boys at one dollar per day.

WM. GURWELL, Fanning, Doniphan county: I have lived in Kansas thirty-five years; have 5000 apple trees, planted from two to thirty years. For commercial orchard I prefer Ben Davis, Winesap, Jonathan, White Winter Pearmain, and Rawle's Janet; and would add for family use Early Harvest and Domine. Have tried and discarded Yellow Bellflower; not prolific in this climate. I prefer hill with black loam and clay subsoil; any slope but southwest is good. I prefer two-year-old trees, and set them in holes dug two and-half to three feet square with a spade, and set the trees two or three inches deeper than they stood in the nursery. Have tried home-grown root grafts, and was successful. I cultivate to corn, potatoes, pumpkins, and melons, using plow and

harrow. I crop a bearing orchard lightly, and cease when in full bearing. I kill the rabbits. I prune with saw, knife, and clippers, and think it beneficial. I seldom thin fruit on the trees. My trees are planted in blocks. I fertilize the land near the trees with stable litter; I would advise its use on thin soil. I pasture my orchard with calves and hogs, and think it advisable; it pays in some orchards. Trees are troubled with borers; I hunt the borers with a wire. We pick carefully in large baskets and sacks from a step-ladder; I pack in barrels. My best market is northwest of here; I sometimes sell in the orchard at wholesale, retail, and peddle; dry and make cider of the culls; never dry for market. I sometimes store a few apples, and find the Winesap, White Winter Pearmain and Rawle's Janet keep the best. We have to repack stored apples before marketing them. Do not irrigate. Prices have been from 60 cents to \$1.25 per barrel. I employ all kinds of help, and pay one dollar per day.

SAMUEL H. BERT, Moonlight, Dickinson county: Have been in Kansas nineteen years; have 500 apple trees from four to twenty-two years planted; the oldest are twelve inches in diameter. For commercial purposes use Winesap, Missouri Pippin, and Janet, and for family use would add Red June and Maiden's Blush. Have tried and discarded Red Streak, Romanite, Rambo, and Bellflower. I prefer bottom in this locality with a northeast slope. I plant twenty-eight or thirty feet apart. I plant two-year-old trees; rather plant a yearling than three-year-olds. Have never tried root grafts or seedlings. I cultivate even my oldest trees, using a plow and harrow; it pays. I grow corn in young orchard until too large; then nothing, just cultivate. Windbreaks are essential, and should be made of Osage orange or mulberries; but not too close to the orchard. I tie corn-stalks around the trees to protect from rabbits, and keep the trees low, to shade the trunks to protect against borers. I prune to prevent forks, to keep from splitting. I thin apples when necessary; this should be done when they are about half grown. I prefer to plant my trees in blocks. An orchard should be fertilized with fine stable litter. I would advise the use of it, especially on upland soil. Never pasture my orchard. My trees are troubled with flat-head borers. Never sprayed much, but think it would be beneficial. I pick in sack hung over shoulder. We make three classes of our apples—large, small, and specked. Have no particular way to market; sell any way I can, but never in the orchard. We make cider, boiled cider and apple-butter of the culls. Never have tried distant markets. Never dry any. Store some for winter in bulk and in barrels in cellar; am successful; find that the Winesaps keep best. Have never tried artificial cold storage. We have to repack stored apples before marketing; lost very few this winter, as I kept them out of the cellar until December; then they kept well. I do not irrigate. Prices have been from 60 cents to \$1.50 per barrel.

G. E. SPOHR, Manhattan, Riley county: Have resided in Kansas twenty-six years. Have an orchard of 3000 trees, nineteen years planted. Originator of the Spohr apple (described elsewhere). Plants for commerce Winesap, Missouri Pippin, and Ben Davis; for family orchard, Winesap, Missouri Pippin, Maiden's Blush, and Early Harvest. Have tried fifty varieties, but think none of them paid better than those named. I live on bottom land, eight feet to water. Any slope is good. Prefer sandy loam. Plant two-year-old, well-pruned trees, in large holes. Cultivate thoroughly, planting to corn until seven years old; then seed to alfalfa. I favor windbreaks of Scotch or Austrian pines, planted in three rows ten feet apart. I believe in pruning, and always have my knife open when in the orchard,

and trim at all times; like to have trees, not brush piles. The deity governing Kansas winds thins the fruit sufficiently. Apple trees are more fruitful if varieties are mixed in planting. Use all the two- and three-year-old stable litter I can get. Do not pasture my orchard. Spray with London purple one week before and two weeks after blooming, for canker-worm, leaf-roller, and codling-moth, and have reduced the latter by it. I hunt the borers and go after them with a hot (?) iron. Pick by hand, and sort to suit customers. Pack in eleven-peck barrels, and mark with stencil. Sell my best apples to shippers, and make vinegar and hog and cattle feed of culls. My best market is Colorado, but I sell in orchard. I store successfully for winter in a cave in bulk, and find Winesap and Missouri Pippin the best keepers, losing about ten per cent. Prices average fifty cents per bushel. Pay help from \$12.50 per month to 75 cents per day and board.

R. D. OSBORNE, Soldier, Jackson county: Have lived in the state thirty-one years; have 500 apple trees, from three to sixteen years planted. For commercial purposes I prefer Ben Davis, York Imperial, Gano, and Winesap; for family orchard, Winesap, Missouri Pippin, and, for summer, Early Harvest, Maiden's Blush, and Cooper's Early White. Have tried and discarded Vandevere, as it does not bear, and Willow Twig on account of blight; Rawle's Janet no good on market. I prefer hilltop if well cultivated; otherwise bottom, with a loam soil and a sandy subsoil, and a southeast slope to protect from southwest winds. I plant two-year-old trees, three feet to head, not less than three limbs to form head, thirty feet each way. I cultivate with plow, harrow and spade the square immediately surrounding the tree. I plant corn in the young orchard and seed the bearing orchard to clover; cease cropping at five or six years. I think windbreaks essential on southwest, and would plant Osage orange or Russian mulberry. I wrap with grass or tarred paper to protect from rabbits. I prune in May to spread the top and thin the fruit. I seldom thin the fruit, but it will pay to thin the last of May. I fertilize with stable litter, but would advise it only on hill orchards. I pasture the orchard with hogs and horses, and think it advisable, and that it pays. My apples are troubled with codling-moth. I spray during May, after the blossom has fallen, with kerosene emulsion, sulphate of copper, and London purple, for codling-moth, blight, and insects generally. I think I have reduced the codling-moth. I treat borers with crude carbolic acid diluted with water. I dig around tree down to the roots, dam outside, fill around tree with water and acid strong enough to tingle your tongue. I hand-pick from ladders by the ordinary method. Never sell in orchard; make cider of second- and third-grade apples; feed culls to stock. My best markets are Holton and Topeka; never have tried distant markets. Never dry any. Store but few apples in an orchard cave, nine feet deep, eight feet wide by twenty-four feet long. The apples are put on shelves about ten inches deep.

H. L. JONES, Salina, Saline county: Have lived in Kansas forty-four years; have an apple orchard of 6000 trees, planted from five to twenty-five years. For market I prefer Missouri Pippin, Winesap, Jonathan, Lowell, Cooper's Early White, Grimes's Golden Pippin, and Wealthy. For family orchard would plant Early Harvest, Maiden's Blush, Jonathan, Winesap, Missouri Pippin. Have tried and discarded Alexander as a shy bearer which rots on the tree. Prefer bottom land here, sandy soil, free from clay or hard-pan. Preferable with northeast slope. Plant well-branched two-year-old trees; turn deep cross-furrows the distance the trees are wanted apart; cultivate in corn until the trees are five or six years old;

after that use the plow and disc harrow and plant nothing. I emphatically believe that windbreaks are essential. They may be made of anything hardy and suitable, as Osage orange, box-elder, walnut, etc. To protect from rabbits, wrap with grass or corn-stalks. I only prune with shears and saw, to clear the limbs off the ground a little. I believe stable litter is good for an orchard. I pasture very little, and do not think it good for an orchard. I spray as soon as the leaves start, with Paris green or London purple, mostly for canker-worm, and doubt its effect upon codling-moth. Thrifty trees are not usually bothered with borers, and unthrifty trees should be made into firewood. Our pickers use sacks with strap over the shoulder. We sort into four classes: First, large, sound fruit; second, small sound fruit; third, slightly damaged fruit; fourth, culls. Very little packing is done here; apples are usually sold to shippers in bulk. I sell my culls to hundreds of farmers in this and adjoining counties for canning, apple-butter, etc. My best market is here in Salina. I have tried distant markets, but it did not pay very well. Have never dried any; stored but few for winter in baskets and barrels. I find the Missouri Pippin, Winesap, Rawle's Janet and Romanite are the best keepers. Our loss in keeping varies with the season and the condition of the apples at picking time. Have never irrigated any. Prices during the past six years have varied from twenty-five to fifty cents per bushel. I use men and boys to help pick and at spraying time in the spring, usually paying one dollar per day.

N. CHRISTENSEN, Mariadahl, Pottawatomie county: I have lived in Kansas forty years. Have an apple orchard of four acres, from five to twenty-five years planted. For all purposes I prefer Ben Davis, Missouri Pippin, and Winesap. I prefer second-bottom land with a black loam, a clay subsoil, and a northeast slope. I prefer good two-year-old trees planted thirty feet apart, alternated with peaches. I have cultivated my orchard to corn, but do not think it advisable. I used a plow, cultivator and disc for eight years. I have cultivated the young orchard both ways twelve times, and shall keep on with the disc and harrow. I cease cropping after six or eight years, and then grow alfalfa. Windbreaks are not essential. I use wire-cloth as a protection against rabbits; I would not risk an apple or pear tree without it. I prune with a knife, saw and shears when the trees are young; I think it beneficial, as it makes the trees healthier. I fertilize my orchard with stable litter; I spread it all over the ground and then harrow it in. I pasture my orchard with calves after it is six or eight years old and has been seeded to grass; I think it pays in an old orchard. My trees are troubled with tent-caterpillars and borers. I have not sprayed yet, but think I shall this spring with Bordeaux mixture. I pick my apples by hand; sort into two classes. I feed my second and third grades and culls to the calves and hogs; have made cider of them, but could not find market for it. I have tried shipping apples to distant markets, but it did not pay. I dry some apples for home use, using stove and sun; neither way is satisfactory. I store my best apples in bulk in a cellar under the house; am not very successful; I find Ben Davis and Winesap keep the best. Prices have been from twenty-five to fifty cents per bushel. I do not hire any help; the family does the work.

H. R. ROBERTS, Perry, Jefferson county: I have lived in Kansas since 1859; have an apple orchard from four to twenty-eight years old. For a commercial orchard I prefer Jonathan, Ben Davis, Winesap, Missouri Pippin, and Maiden's Blush; and for a family orchard Red June, Maiden's Blush, Jonathan, Winesap, and Rawle's Janet. I prefer midland altitude or bottom, with a rich loam and a

clay subsoil, and a northeast slope. I prefer two-year-old trees with upright heads, set 30x40 feet in squares. I cultivate my trees with a plow and cultivator until they occupy most of the ground. I plant corn and potatoes in a young orchard, and cease cropping when the size of the trees renders it impossible. I seed the bearing orchard to red clover. Windbreaks are not essential; a hedge fence is all that is necessary, and this ought not to be nearer than forty feet of the trees. For rabbits I wrap the trees; and dig the borers out with a knife. I prune sparingly with a knife or sharp ax to remove all dead or injured limbs; I think it pays. I thin the fruit when the trees are overloaded, by taking off one-half after they are the size of marbles. My trees are planted in blocks for convenience in picking. I fertilize my orchard with all the barn-yard litter I can get, scattered broadcast; would advise its use on all soils unless already very rich. I am sorry to confess I have pastured my orchard with hogs; it is not advisable. My trees are troubled with canker-worm, tent-caterpillar, root aphid, roundhead borers; and buffalo tree-hopper; and my apples with codling-moth, curculio, and gouger. I have sprayed just as the buds open for canker-worm; have also sprayed for codling-moth. I pick all the apples I can reach from the ground in baskets, and the rest from ladders into sacks; I handle very carefully. I sort into two classes from a table as they come from the trees; pack in eleven-peck barrels for fall use, and twelve-peck barrels for winter use, carefully shaken and pressed; mark with the grade and name of variety and haul to market on wagon. I always sell in the orchard by car lots, when I can. I retail the scattered ones; send the third grade to the cider-mills. My best markets are sometimes both east and west of here. I never ship to commission men; it don't pay. I don't dry nor store any. I do not irrigate. I employ men and boys (men preferred). Pay one dollar per day and dinner.

W. D. KERN, Baldwin, Douglas county: I have resided in Kansas thirty-nine years. Have an apple orchard of 775 trees four years old. For market I prefer Missouri Pippin, Ben Davis, and Willow Twig, and for family orchard Yellow Transparent, Maiden's Blush, and Jonathan. I prefer a loose, porous subsoil on a north slope. I prefer one- or two-year-old trees, set twenty-two feet apart north and south and thirty-three feet east and west. I plant my orchard to corn, potatoes, and clover, and keep up the cultivation until they are bearing well, using a diamond plow and one-horse cultivator. I never cease cropping. Windbreaks are not essential, but if they were I should make them of four or five rows of maple or some quick-growing trees, on the south and west sides of the orchard. For rabbits I use wooden tree wrappers, and dig the borers out. I prune to give the tree shape and let in the sun; I think it pays, as it keeps the tree from over-bearing. I do not thin the fruit while on the trees, but think it would pay. I fertilize my orchard with barn-yard litter, and would advise it on all soils when it needs it. I pasture my orchard with hogs; I think it advisable, and that it pays. My trees are troubled with canker-worms, tent-caterpillars, borers, tree-hoppers, and leaf-rollers, and my apples with codling-moth and curculio. I do not spray. I hand-pick my apples into buckets and sacks from step-ladders. I sell my apples in the orchard at wholesale. I sell the best to shippers, and the second and third grades the best way I can. I sell or feed the culls to the stock. Never tried distant markets. I do not dry any. Some years I am successful in storing apples in barrels and boxes in a cellar. Winesap and Missouri Pippin keep best. I never tried artificial cold storage. I have to repack stored apples before marketing, losing about one-fourth of them. I do not irrigate. Prices have been from sixty cents to one dollar per eleven-peck barrel. I employ men at ten cents per hour.

JAMES SHARP, Morris county: Have been in Kansas twenty-eight years. Have an orchard in Morris county of 8000 trees, planted from two to thirteen years. I grow for market Ben Davis, Missouri Pippin, Jonathan, and York Imperial; would add for family Early Harvest, Maiden's Blush, and Winesap. Have tried and discarded Yellow Bellflower, Lawver, Willow Twig, and Smith's Cider; the former is barren, the others blight. I prefer second bottom with northeast slope; soil loose, black loam, with red clay subsoil. I plant in furrows each way, 16x30 feet, running a subsoiler in the furrows, and use straight, smooth, two-year-old trees. Have tried root grafts, but they need nursery care at first. I cultivate at all ages, while young with plow, and old orchard with reversible disc. I grow corn in young orchard, and after five or six years keep the ground bare with the disc. I think windbreaks essential, and use Osage orange, elm, ash, Austrian pine, and cedars. Catch the rabbits; and cultivate well as a protection from borers. Do not prune much; take out a little brush if necessary to more readily reach the fruit. Never have thinned apples. Have never fertilized, and am decidedly opposed to pasturing orchards with any kind of stock. Am troubled with canker-worm, tent-caterpillar, flathead borer, woolly aphis, twig-borer, fall web-worm, leaf-roller, leaf-crumpler, and codling-moth. Spray regularly with London purple; cannot say it has reduced the codling-moth any; for borers I keep my trees thrifty by constant cultivation. We pick in candy pails, but find it bruises the fruit too much. I sort by hand in three classes, commercial size Nos. 1 and 2, and culls. I pack in three-bushel barrels, stenciled with name of variety and grower, and ship by freight. Sell any way I can; have never sold in the orchard; sell culls for apple-butter, and make some cider; have marketed at good prices at Pueblo, Colo.: have never dried any for market. I store some for winter in boxes, barrels and in bulk in a cellar, and find that Ben Davis and Missouri Pippin keep best. I usually have to sort over those kept through, and lose perhaps one-fifth. Have never irrigated. My average returns are about fifty cents per bushel. For help I use men at one dollar per day.

JAMES WILSON, Assaria, Saline county: Lived in Kansas twenty years; has an orchard of five acres, twenty-three years planted. For commerce he uses Ben Davis, Missouri Pippin, and Jonathan, and for family use would add Maiden's Blush, Grimes's Golden Pippin, and Rawle's Janet. Has discarded Rambo as too shy a bearer. Prefers light soil, with a heavy subsoil in the bottom, with a southern slope. Plants thirty feet apart each way. Grows no crop in orchard, and cultivates with stirring plow and cultivator until the trees completely shade the ground. Believes windbreaks necessary, and would plant box-elder, three feet apart, in rows three feet apart, so as to shut out all wind. Binds with corn-stalks to protect against rabbits. Prunes by cutting off lower limbs and thinning center; says it is beneficial, and makes fruit larger and of better color. Thins apples on trees when the size of marbles, and believes it pays. On pollination he says: "I had one tree that stood alone, and never bore fruit until I got honey-bees; then it bore all right." Uses no fertilizers. Allows no live stock in the orchard. Has sprayed just after the blossom fell, with London purple and Bordeaux mixture, for the last five years, and it has reduced codling-moth. Uses knife and soap-suds for borers. Picks and sorts into three classes—sound and big, medium and affected, and culls. Sells in orchard and in Salina; makes vinegar and hog feed of culls. Never shipped any apples. Stores for winter by burying in bulk, and is successful. The Missouri Pippin and Rawle's Janet keep best. Prices from fifty to seventy-five cents per bushel. Uses boys from fourteen to twenty years of age for help, and pays fifty cents to one dollar per day with board.

J. W. WILLIAMS, Holton, Jackson county: I have lived in the state forty years; have an apple orchard of 225 trees of various ages, the oldest being thirty-nine years. For market I prefer Ben Davis, Missouri Pippin, Winesap, and Jonathan; and for a family orchard Red Astrachan, Early Harvest, Dominic, Lowell, and Winesap. Have tried thirty varieties and discarded all excepting the above mentioned. I prefer a rich soil with a porous subsoil and a north slope; can see little difference between hilltop and bottom orchards. I prefer two-year-old trees, with symmetrical form, for setting; when planting I trim all affected roots and prune lightly; set them inclined to the southwest. I cultivate my orchard as long as it lives with a plow and harrow—plow shallow; plant the young orchard to potatoes, beans, vines, and sometimes corn, using a one-horse diamond plow, and am careful to harrow afterward. I cease cropping six or seven years after setting, and plant a bearing orchard to red clover. I think windbreaks are essential; would make them of most any kind of rapid-growing trees planted in groves on the east and south sides of the orchard. For rabbits I wrap the trees, and dig the borers out. I prune with a penknife to keep the trees in good shape. It pays if properly done, and is not too severe. I have thinned my fruit by hand when of the size of hickory-nuts. Think trees do best in mixed plantings. I fertilize my orchard with barn-yard litter and ashes; I think it beneficial, and would advise its use on all soils. I pasture my orchard with hogs part of a day at a time when the apples fall badly. Don't let them in at will. I think it pays and is advisable, for they destroy the moth. My trees are troubled with both round- and flathead borers, and my apples with codling-moth. I spray, using a hand sprayer, with Bordeaux mixture and London purple, when the blossom falls, for codling-moth and curculio. It has not been beneficial. I burn the [tent] caterpillars. I pick my apples by hand in a sack over the shoulder, and sort into three classes—first, finest; second, fair; third, culls. I sort from the ground or a table. I sell apples in the orchard, wholesale and retail, and have no trouble in selling my first-grade apples. I sell and make cider of the second and third grades, and also dry some of them. Feed the culls to hogs or other stock. My best market is at home. We dry some in a common dry-house which is very satisfactory; after they are dry we put them into sacks to keep from millers; we find a market for them, but it does not pay well. I am fairly successful in storing apples on shallow shelves in the cellar; Winesap and Rawle's Janet keep best, I do not irrigate. Apples have been about fifty cents per bushel, and dried apples three to five cents per pound.

ANDREW SWANSON, Dwight, Morris county: I have resided in Kansas seventeen years, and have an apple orchard of 1800 trees eight years old, eight to ten feet tall. For market I prefer Winesap, Ben Davis, and Missouri Pippin; and for family orchard would add Jonathan and Maiden's Blush. I have tried and discarded Rome Beauty, Huntsman's Favorite, and Minkler. I do not like them. I have upland, with a poor soil and a gumbo subsoil, with a north and east aspect. I prefer two-year-old trees, set thirty feet apart each way. I cultivate my orchard with a stirring plow, and intend to keep it up as long as I live; plant corn or any cultivated crop in the young orchard, and cease when there is no room; plant nothing in the bearing orchard. I think a hedge fence all around the orchard as a windbreak would be beneficial. For rabbits, I wrap the trees with wire screening, and leave it on. I prune my trees every winter, or when I have time, to thin the top and to give shape; I think it pays, and is very beneficial. I do not thin my fruit—the wind does that for me. I fertilize my orchard, and think it beneficial, and would advise it on all soils. I do not pas-

ture my orchard; it is not advisable and does not pay. My trees are troubled with leaf-rollers and other insects. I give the culls to hogs. I am successful in storing apples in bulk in an arched cellar; Winesap, Ben Davis and Missouri Pippin keep best. I never tried artificial cold storage. I do not irrigate. Price has been seventy-five cents per bushel; dried apples eight to ten cents per pound.

F. B. HARRIS, White City, Morris county: I have lived in Kansas twenty-five years, and have an orchard of 800 trees, planted from ten to fifteen years ago. For commercial purposes I prefer Maiden's Blush, Cooper's Early White, Ben Davis, Winesap, and Missouri Pippin. For a family orchard I would put out the same, adding, Red June, Jonathan, and Smith's Cider. I have discarded the Willow Twig, as it rots too easily. I prefer hilltop, north slope, soil as deep as possible, and a gumbo subsoil. Would plant two-year-old trees with perfect crown growth, twenty feet north and south, thirty feet east and west. My last planting, ten years ago, was of root grafts, and I like it first rate. I grow corn in the orchard for about ten years, then nothing. I cultivate thoroughly, plowing until the soil is doubled, and then use the disc pulverizer. I believe wind-breaks to be very, very, very essential, and would make of Osage orange on the outside, and any quick-growing forest-tree next to the orchard. For protection against rabbits, I tie with weeds and twine. I prune with a jackknife, a two-inch thin-bladed chisel, and mallet. It does pay, and is beneficial until the trees are ten years old. I tried thinning, but it proved more injury than profit. I use all the fertilizer from stables and stock-yards that I can get, spread all over the ground, and believe it would pay on any soil. I would allow no live stock in the orchard but poultry, and would not allow them to roost in the trees.

I have some trouble with tent-caterpillars, roundheaded borers, fall web-worm, and curculio. I spray with London purple, first when the bloom falls, then every ten days until three times, with a spray pump, using London purple. I do not know whether I have reduced the codling-moth any or not. I treat the borers with penknife and probe, others with rough handling—eternal, vigilant destruction. I pick from step-ladders into pails; place in sack to haul to the barn or shed. We sort into two classes—first, all sound and marketable, second for cider. I sort by hand from the pile, three or four bushels at a time. We pack in bushel-and-a-half sacks, filled from the half-bushel measure, mark with the name of variety, and haul to market in spring wagon. I retail and peddle them, making the culls into cider and vinegar. My best market is our nearest town; tried distant market last fall and it paid. We dry some, pack into tight boxes as soon as dried and store in dark place, and find a ready market at the stores at six cents per pound. It does not pay very well, but saves waste. I only store for family use, in headless barrels; generally keep well. Ben Davis keeps the best. We lose from one-fourth to one-half. I believe irrigation would be a good thing. Prices have been from thirty-five cents to seventy-five cents per bushel. Use only home help.

M. D. WELTNER, Westmoreland Pottawatomie county: Have been in Kansas eighteen years. Planted 800 apple trees ten years ago. I do not own this orchard at present. I planted Ben Davis, Missouri Pippin, Winesap, Jonathan, and Maiden's Blush. I prefer sandy or black loam, with clay subsoil, bottom land or gentle slope to the north. I set good, thrifty, clean, two-year-old trees. I thoroughly plow my ground, then run a lister for the row, and throw out with spade or shovel where the trees are to go. I cultivate with potatoes and corn, using the plow, harrow, and five-tooth cultivator, until ten or twelve years old, then sow to clover.

I use no windbreaks. For rabbits I wrap with building paper or wire screen. I believe it pays to prune with the knife and saw a little each year, to train the tree to grace, beauty, and profit. I never tried thinning fruit. Would fertilize with a little stable litter spread over the ground. Never would pasture an orchard. Had some canker-worm and curculio, but never tried spraying. I pick from a step-ladder into a shoulder sack.

V. E. HATHAWAY, Council Grove, Morris county: Have lived in Kansas thirty years; have an orchard of 1000 trees two to twelve inches in diameter. Have tried and discarded Willow Twig and Smith's Cider on account of blight. I prefer a gravel or clay bottom with northern slope. I prefer healthy trees set forty by twenty feet. I cultivate my orchard to corn until too large, plowing very shallow. Windbreaks are beneficial; would make them of cedar. I prune by cutting out the inner limbs that rub; I think it pays. I do not thin the fruit on the trees. I sometimes fertilize with stable litter; would advise its use on all soils. I do not pasture my orchard; do not think it advisable. My trees are troubled with canker-worm, and my fruit by codling-moth. I spray just after the blooms fall with London purple, and think I have reduced the codling-moth. I dig out insects not affected by spraying. I pick my fruit from inside of tree from a ladder. Sort into three classes. Pack in apple barrels, pressed down, and marked with the quality; then transport to market on a wagon. I wholesale, retail, and paddle; sometimes sell in the orchard. Feed the culls to hogs. My best market is at home; never tried distant markets. Do not dry any. I store apples in boxes or barrels, and am successful. I find Missouri Pippin, Winesap and Ben Davis keep best. We have to repack stored apples before marketing, and lose about one-eighth or one-tenth. I do not irrigate. Prices have been from fifty cents to one dollar per bushel.

S. MARTY, Longford, Clay county: Have lived in Kansas twenty-eight years; have an apple orchard of 200 trees from seven to fifteen years old, eight to ten inches in diameter. Have tried and discarded Grimes's Golden Pippin and Willow Twig. I prefer sandy bottom, loam soil, with a north or northeast aspect. I prefer two-year-old, low, stocky trees, set in rows thirty-six feet each way. Have tried root grafts with very good success. I cultivate my trees eight years; first four to potatoes, using a disc harrow; plow shallow among young trees; plant nothing in a bearing orchard. Windbreaks are essential; would make them of Osage orange and box-elder on both south and west sides of the orchard. I trap and shoot the rabbits. I prune very little; only cut out the branches that interfere. I fertilize my orchard with barn-yard litter; I think it beneficial. I do not pasture my orchard; do not think it advisable. Do not spray. Sort into two classes: good and bad.

J. L. STEELE, Minneapolis, Ottawa county: Have lived in Kansas fourteen years. Have 200 apple trees from six to twelve years old. I prefer bottom land with sandy loam and similar subsoil, north slope. I plant two-year-old trees branched near the ground, in deep furrows made by plow. Have tried root grafts with good success. I cultivate with corn and potatoes, using disc and harrow all the time; plant nothing in bearing orchard; cease cropping when about eight or ten years old. Windbreaks are essential, on the south; would make them of honeylocust, two or three feet apart in the row. I wrap the tree with corn-stalks to protect from rabbits. Have not been troubled with borers. I only prune out the limbs that interfere with others. Never thin apples. I fertilize with stable

litter, and think it beneficial; would advise its use on all soils. I do not pasture my orchard; it does not pay. My trees are troubled with canker-worm. I spray with London purple when the worms first begin their work, to kill leaf-eating insects; do not think I have reduced the codling-moth. I irrigate with a 4½-inch-cylinder pump and well.

J. C. CAMPBELL, Campbell, Washington county: Have lived in Kansas fifteen years; have 250 trees from three to fourteen years old, eight to twelve inches in diameter. I prefer for family orchard Ben Davis, Missouri Pippin, Winesap, and Rawle's Janet. I prefer hilltop with deep soil and red subsoil, and an eastern slope. I prefer three-year-old trees, set 24x30 feet, as deep as they were in the nursery. I cultivate in buckwheat for eight years with the plow; after that plant nothing. Windbreaks are essential on the southwest or north and south; would make them of Osage orange; plant them forty feet distant and do not trim. For rabbits I wrap with corn-stalks and leave them on summer and winter. I prune with a saw; then cover the wound with wax; I think it beneficial. Have never thinned fruit. Never use fertilizer; do not think it advisable. Do not pasture my orchard; would not advise it. My trees are affected with twig-borer and leaf-roller. The codling-moth troubles my apples. I do not spray. I pick my apples early and leave them in piles in the orchard until cold weather.

WILLIAM YOUNG, Brantford, Washington county: Have lived in Kansas twenty-one years. Have 200 apple trees, five to twenty-five years planted, four to twelve inches in diameter. I prefer for commercial orchard Winesap, Ben Davis, and Rawle's Janet. I prefer bottom land, with black loam and clay subsoil. I prefer three-year-old trees, good, smooth bark, and three or four branches. Have tried root grafts and seedlings with good success. I cultivate in corn, using plow for thirteen years; plow toward the trees one year, then away the next. Windbreaks are essential, and I would make them of cottonwood, box-elder or catalpa planted in rows on the north side. Am not troubled with rabbits or borers. I prune with a saw and knife, to produce better fruit; I think it beneficial. I fertilize with stable litter and wood ashes; I would advise its use on all soils. I pasture my orchard with hogs; think it advisable, and that it pays. My trees are troubled some with insects; codling-moth troubles my apples. I pick my apples by hand into a basket, then sort and put in the cellar. I sort into two classes, good and bad; we sort as we pick them. I sell my apples at home and in town, sometimes in orchard; retail, wholesale, or peddle. Make cider for vinegar of culls. My best market is Clifton; never tried distant markets. Never dry any. I store some for winter market in thin layers on shelves, in cellar seven feet deep, and find the Winesap keeps best. Prevailing price has been eighty cents.

H. E. PENNY, Hiawatha, Brown county: Have lived in Kansas twenty-eight years. Have 1800 apple trees—600 planted fifteen years, 1200 planted ten years. Grow nothing but Ben Davis. Planted two-year-old trees, twenty-four by thirty feet, on a southern slope. Cultivate in corn for ten years and then sow to clover. I prune only to keep the watersprouts from bothering the tree. I believe fertilizing pays, although I have not tried it. I never allow any stock but poultry in the orchard. I spray after the bloom has fallen, and ten days later, with Paris green, to destroy the codling-moth. We sort out only one grade, allowing the culls to rot. We pack in three-bushel barrels, and usually sell in the orchard at wholesale. Our best market is Minneapolis, Minn., but I have not made ship-

ping pay. I have tried artificial cold storage; they did not keep satisfactorily, I do not know why. I had to repack, and lost over twenty per cent. Prices have varied from 75 cents to \$1.50 per barrel. For help, I use boys at fifty cents to seventy-five cents per day.

J. D. HAZEN, Leona, Doniphan county: Have been in Kansas forty years; have an apple orchard of 13,200 trees; 10,000 have been planted fourteen years, and 3200 for two years. I would plant nothing but Ben Davis for commercial purposes. For the family orchard I would add Winesap, Jonathan, and Rawle's Janet. Prefer rather high land, well underdrained, with a northeast slope. I plant good two-year-old trees, in rows two rods apart east and west, and the trees one rod apart in the row north and south. I grow corn or potatoes for six years, then seed down to clover. I cultivate the trees while young with a small one-horse plow. I think windbreaks essential on the south and west sides; Osage orange is good, set the same as for a fence, and allowed to grow tall. I wrap my trees against rabbits, and try all ways to destroy them. I prune with the saw to get the trees up so I can get around them, and believe it pays, or I would not do it. Have been at it fifteen years, and see no harm. Do n't think it would pay to thin apples on the trees. I believe it is better to mix varieties in the orchard; I have 7000 Ben Davis and 300 Winesaps in one orchard, and where the Winesaps are mixed with the Davis the trees are always fuller. I believe fertilizing would be good, but my orchard is too large to practice it. I pasture with horses in the spring, and believe it does no harm, and that it pays.

Canker-worm is my worst insect pest, and I have been spraying for many years, using one pound of London purple to 160 gallons of water. I spray when the blossoms fall, using a big tank and a small engine to pump. I cannot say that I have reduced the codling-moth any by spraying. I cut borers out. I sort into two classes, No. 1's and No. 2's, bests and second bests; best ones go into firsts, and those that are not rotten in No. 2. I have a table, or what I call a culler; the apples are picked and put into these cullers; I have twelve men to each culler and a boss over them. They stand and cull the apples. I have the cullers numbered, so if any one puts up bad apples I can catch him. I use barrels for the No. 1's; fill and press so they will not shake. I put them up in good shape, and sell at wholesale to the first buyer that comes. I ship my culls and second-grade apples to western Kansas and to Nebraska in cars in bulk. I never send to commission men. I have never tried drying, or storing apples for winter. For family use I put away some in barrels, and keep the above varieties successfully. Prices, last year, two dollars per barrel; a year ago, one dollar per barrel; two years ago, \$1.50 per barrel. I use any help I can get, paying seventy-five cents per day and board.

J. B. AVERY, Clifton, Washington county: Have lived in Kansas twenty-eight years; have an apple orchard of 1500 trees, from five to fourteen years planted, three to fifteen inches in diameter. For planting I prefer two-year-old whips. I cultivate my orchard to potatoes or any hoed crop, when it is first planted; keep this up as long as the roots and branches will admit. I have used a disc and common drag harrow for the last three years. I plant my bearing orchard to clover. I prune my trees with a pruning knife and saw when necessary. I fertilize my orchard with thoroughly rotted stable litter. I think it beneficial and would advise its use on all soils. I have pastured eight acres of my orchard with calves; have not seen any injury. I sort my apples into three classes—first, second, and culls. I sell my apples to neighbors, restaurants, stores, etc. The

culls I dry, make cider, feed to pigs, and give away. Clifton is my best market; have never tried distant markets. I store some in boxes, barrels and sacks in a cellar.

T. S. ANDERSON, Oneida, Nemaha county: Have been in Kansas twenty-seven years; have an orchard of 1000 trees fifteen years old, ten to eighteen inches in diameter. Prefer for market Ben Davis and Winesap; for family use, many kinds. Have discarded Rawle's Janet, Early Pennock, Bellflower, and Russets. I prefer limestone soil; bottom land with northern slope. I plant two-year-old, straight-bodied, thrifty looking, live trees. I cultivate in corn, with riding plow, for six years, and then seed to grass. I believe a windbreak is essential, and would make it of Osage orange, maple, or cottonwood. I prevent rabbits and borers by painting with ashes and lime. I prune with saw and knife to make larger apples, and give them better color, and think it pays, I do not thin, and would put fertilizer from the barn-yard on the land. I pasture my orchard with cattle and hogs, but do not think it advisable. I am troubled some with canker-worm, tent-caterpillar, root aphid, borers, codling-moth, and curculio, but do not spray. I gather only the best by hand, and put them immediately in a bin in the cellar. I sell to stores, use plenty at home, make cider, and feed the hogs on culls. My best market is Seneca, Kan. Have never tried drying apples. I store for winter on shallow shelves, six inches deep and two feet wide, in a dry cellar, and keep them successfully; Ben Davis and Winesap keep the best. Prices have ranged from twenty-five to seventy-five cents per bushel. I use common laborers, and pay from one to two dollars per day.

HOWARD MORTON, Tescott, Ottawa county: I have lived in Kansas thirty-two years; I have twenty old apple trees and 400 set two years ago. I prefer Ben Davis, Gano and York Imperial for market, and Maiden's Blush, Early Harvest and Winesap for family use. My orchard is in a bottom with a north slope. I plant two-year-olds with a fair amount of large roots, in furrows made with a lister, and enlarged with a spade where necessary. I cultivate with a disc harrow as long as possible, and grow nothing on the ground among the trees. I believe windbreaks are essential, and would make them by planting Osage orange, Russian mulberry and box-elders in rows six feet apart. I do not prune much; only thin out inside shoots to prevent contact. I believe it pays to thin the fruit some when the apples are perhaps half grown. I use no fertilizers. I do not pasture my orchard. I spray a little before the buds swell, after the blossoms fall, and two weeks later, with Bordeaux mixture, to prevent wormy apples. I dig out borers with a jack-knife and a small wire.

I. N. MACY, Longford, Clay county: Have lived in Kansas fifteen years; have 150 apple trees nine years old, from fifteen to eighteen feet high. For family orchard prefer Ben Davis, Winesap, and Jonathan. I prefer bottom land. I plant two-year-old trees. I cultivate in corn for the shade as long as there is room, using the plow, cultivator, and harrow, and cease cropping when trees shade the ground. Windbreaks are beneficial on the south. I prune to balance the top and prevent the limbs from chafing; I think it beneficial. I never thin apples. I fertilize my orchard with barn-yard litter, keeping my ground as rich as a garden, and would advise its use on all soils. I never pasture my orchard; it is sure death to it; allow nothing larger than chickens in it. I spray only for canker-worms, using Paris green and lime, when in bloom; am successful. I do not irrigate.

A. C. GRIESA, Lawrence, Douglas county: I have lived in Kansas thirty years. For market I prefer Ben Davis, Gano, Jonathan, and Missouri Pippin, and, for a family orchard, the leading medium early and late sorts. I prefer upland or second bottom with a clay subsoil; all slopes, if well drained, are good, excepting south. I prefer good two-year-old trees, set in land laid off with a plow. I plant my orchard to corn for four years and use an eight-tooth cultivator; cease cropping when the trees are four or six inches in diameter; plant clover in a bearing orchard. Windbreaks are not essential in this locality. For rabbits I wrap the trees, and dig the borers out. I prune when the trees are young to thin the top; I think it beneficial and that it pays. I do not thin the fruit while on the trees, but would advise doing so when the fruit is one-third grown. I fertilize my orchard with barn-yard litter, and would advise its use, especially on uplands. I do not pasture my orchard; do not think it advisable: it does not pay. My trees are troubled with canker-worm, root aphid, flathead and roundhead borers, and woolly aphid; and my apples with codling-moth. I do not spray, but would advise it. I am sure it would reduce the codling-moth. I hand-pick my apples in a sack over the shoulder.

A. G. AXELTON, Randolph, Riley county: I have lived in Kansas forty years; have an apple orchard of 300 trees eighteen years old, sixteen feet high. For a family orchard I prefer Ben Davis, Missouri Pippin, Winesap, and Maiden's Blush. I prefer black bottom land with a clay subsoil, and a northern slope. For planting I prefer two-year-old, straight, smooth trees. I cultivate my orchard till the trees begin to bear, with a cultivator and hogs, planting nothing. Windbreaks are not essential. For rabbits I wrap the trees with paper. I do not prune my trees, nor thin the fruit while on the trees. I do not fertilize. I pasture my orchard with hogs at certain times in the spring when worthless apples are dropping. My trees are troubled with canker-worm and tent-caterpillar. I do not spray. I pick my apples by hand and carry them to the cellar. I do not store any apples for winter market.

C. H. TAYLOR, Eskridge, Wabaunsee county: Have lived in Kansas thirty-eight years. Have 1400 apple trees, five to fifteen years old, six to twelve inches in diameter. For market I grow Ben Davis, Missouri Pippin, and Jonathan; for family orchard I would advise Winesap, Rawle's Janet, Cooper's Early White, Maiden's Blush, and Jonathan; and I would discard nearly all others. I prefer bottom land, with black loam and open subsoil, north slope. Would plant one- or two-year-old, low-top trees, twenty-five feet apart each way. I have grown root grafts with success. I shall cultivate as long as the trees live, growing corn among them until the growth of the trees prevents it. I believe all the windbreak necessary is an ordinary fence. I use traps for the rabbits and a knife for the borers. I thin the fruit on the trees in the early summer, after they are well set. I believe barn-yard fertilizer beneficial to any orchard. I pasture my orchard with hogs, and think it advisable, and that it pays. I have some insects, but do not spray; I burn some. I pick by hand in half-bushel baskets; sort into two classes, market and cider; pack into barrels, and usually sell in the orchard at wholesale. Never shipped to a distant market. Do not dry any. Have stored some for winter in the cellar in bulk, and find that the Missouri Pippin, Winesap and Rawle's Janet keep the best. I do not irrigate. Price averages about twenty-five cents per bushel. I use ordinary farm hands at fifteen to twenty dollars per month.

FRANK SEIFERT, Strawberry, Washington county: I have lived in Kansas twenty-eight years; have an apple orchard of 150 trees, from three to twenty years planted. For commercial purposes I prefer Ben Davis, Missouri Pippin, and Winesap, and for family orchard would add Maiden's Blush. Have tried and discarded Willow Twig on account of blight. I prefer limestone upland with an eastern aspect. I prefer three-year-old trees for planting. I cultivate my orchard for eight or ten years with a plow and harrow. I seed bearing orchard to red clover. Windbreaks are essential; would make them of one row of box-elder and two rows of plums. I fertilize my orchard with straw and hay, and think it advisable, on all soils. I never pasture my orchard; it is not advisable. I do not spray. I pick my apples the old way. [?] Sell my apples in the orchard. I sometimes store for winter in bulk in an arched cellar, and am successful. I find the Ben Davis, Missouri Pippin and Winesap keep equally well. Prices have been from fifty to seventy-five cents per bushel.

J. T. TRAVIS, Aurora, Cloud county: Have lived in Kansas twenty-six years; have an apple orchard of seventy-five trees from five to twenty years old. I prefer low land, black loam soil with clay subsoil, and a northern slope. I prefer two-year-old trees, straight, with no forks, the limbs low down, planted in furrows made by a plow. I cultivate my orchard as long as I can get through it, with potatoes and sweet corn, using a harrow often enough to keep weeds down and ground smooth. Cease cropping when the trees get too large for sweet corn to do any good. Windbreaks are essential; would make them of Russian mulberry, planted in two or three rows, eight to ten feet apart, on all sides of the orchard. I prune little, only enough to thin out the tops and keep limbs from rubbing each other, and to give light. I fertilize my old orchard with any kind of coarse stable litter; I pile it in heaps between the trees and let it lay until it rots. I pasture my orchard with hogs when it grows to wild rye and is too large for me to plow; I think it advisable only when the trees get foul; it pays if not pastured with too many and they are not kept on too long. My trees are troubled with leaf-roller, and my apples with codling-moth. I have sprayed, but only to a limited extent.

SAM KIMBLE, Manhattan, Riley county: Have been in Kansas thirty-eight years. Have an orchard of 2500 trees not yet in bearing. They have been planted three, four and five years. I have set out for market Ben Davis, Missouri Pippin, and Winesap, and for family use about thirty kinds, in variety. I am located on upland, with clay subsoil, mainly northwest slope. I planted three-year-old trees, stocky and low headed, in holes twenty-five by thirty feet apart, getting on my knees to work the soil in about the roots. I crop to corn, cultivating well, and shall keep this up as long as three rows can be fairly grown between two rows of trees. I believe in plowing if you do not get too close to the trees. When my orchard comes into bearing I shall keep up the cultivation but grow no crop. I believe windbreaks are very desirable, and should make them of cottonwood, elms, or any quick-growing forest-trees. To keep off rabbits I tie on corn-stalks with binder twine. I prune carefully to shorten the heads and keep down watersprouts, and believe it beneficial. I believe thinning will pay when the fruit sets too thickly. I believe in lots of fertilization, and use all the stable litter I can get; I do n't think you can use too much. I believe that young calves might be pastured to advantage in an old orchard. Have not sprayed any, and depend on rains for water.

J. B. STARNES, Fairmount, Leavenworth county: Have lived in the state forty-one years; have 1800 apple trees, extra large, seventeen years old. Planted for market Ben Davis, Winesap, Jonathan, and Missouri Pippin; and for early use Early Harvest, Cooper's Early White, Maiden's Blush, and the Gennettan. Have discarded the Red June as too small and falling too badly. My ground is black loam upland, sloping north and east. I planted two-year-old trees in furrows made by the plow, twenty by thirty-two feet. Would cultivate in corn for five years, using the breaking-plow and cultivator; then sow to clover. Wind-breaks are not necessary here. I trap the rabbits. For borers I bank around the trees in May, and take it away in September; this exposes the tree, and the borers are taken out easily with a knife. I prune some, and think it pays to take off watersprouts and shape the tree a little. Do not thin, and do not fertilize. I pasture in the spring and fall, after the apples are gathered, with pigs; it is an experiment. I have some tent-caterpillar, twig-borer, and codling-moth. Have never sprayed any. I pick in sacks and baskets, emptying into bushel boxes, which are hauled on wagons made for that purpose, to the place for packing. I make three grades: shippers, seconds, and cider or driers. The boxes are taken from the wagon and culled, and shippers packed in barrels; the rest are put in piles, which are afterward culled, and the seconds put by themselves. We mark barrels with name of variety, and haul to market on wagons made for the purpose. We often sell at wholesale in the orchard; we sell the seconds in bulk. My best market is Leavenworth; have never shipped any away. Have never dried any, and do not store any for winter. Prices have ranged from 50 cents to \$1.75 per barrel. I use men only, and pay \$1.50 per day.

D. N. BARNES, Leavenworth, Leavenworth county: I have lived in Kansas thirty-seven years; have 2000 apple trees twenty years old. The best for commercial purposes is New York Pippin [Ben Davis]. For family orchard I prefer Jonathan, Winesap, Minkler, Huntsman's Favorite, and Lowell. I have tried and discarded Nonesuch. I prefer bottom land, with black loam soil and clay subsoil, with south slope, in my locality. I plant good, stout, thrifty trees, two to three years old, sixteen and one-half by thirty-three feet apart. I cultivate until the trees are large enough to shade the ground. In the young orchard, for the first seven or eight years, I usually grow corn, wheat, or oats; in a bearing orchard I grow orchard-grass and timothy and clover, separate or together. I have not yet ceased cropping. I believe windbreaks are essential, made of hills, trees, or hedge fence. For this purpose I would advise to first find the hills; then plant the orchard and trees or hedge. I dig out the borers, and trap or shoot the rabbits. I believe it pays to prune some to get rid of surplus wood. I believe it pays to thin apples and I do it in July. I fertilize by pasturing with cows, and believe it pays. Am troubled with some insects, but have never sprayed. We pick from a ladder, each man carrying two baskets; we sort into two classes on a table. In the first class we put apples not damaged too much and large enough, and in the other we place the small ones.

J. F. RUHLIN, Wetmore, Nemaha county: Has been in Kansas seventeen years. Owns an apple orchard of 1150 trees, set out from one to three years. Set Ben Davis, Jonathan, Winesap, Missouri Pippin, and for family orchard would add the Maiden's Blush, Rambo, Rome Beauty, and Grimes's Golden Pippin. Has discarded Early Harvest, Red June, and Red Astrachan. Wants upland always, north or northeast slope if possible, and a loose, friable soil, with gravelly subsoil. On planting, he says he uses two-year-old, short, stocky trees

with bushy tops and lots of roots, which he prunes back at setting. Sets trees deeper than they grew at the nursery, 20x30 feet. Puts a barrel half full of soil and water on a sled, and puts ten to twenty trees into it at a time; takes out a tree and sets it with as little exposure of roots to the air as possible. Cultivates well, keeping the ground clean in the tree row all summer. This winter, 1897-'98, he saw fine ten-year-old trees completely girdled by mice, in an orchard that was neglected last summer, and weeds and grass allowed to grow next the trees; these held the snow around the trees, and allowed the mice to burrow under to the tree. Grows corn as a protection to the trees in summer, using a five-tooth one-horse cultivator, shallow and often, near the trees, until they begin to bear, when he sows to clover, and mows frequently. Thinks windbreaks are essential, and if used would make them of Osage orange or mulberry, not very close to trees on north and west sides. Protects from rabbits by wrapping with corn-stalks and will try leaving them on this summer as a protection from sun-scald. Prunes interlocking limbs to get into shape; believes it beneficial. Believes thinning would pay on choice varieties if tree was very full. Believes in using all the barn-yard litter possible, especially on poor soil. Never has pastured orchard, but might put in horses or sheep. Thinks it would hardly pay. Never has sprayed, but believes in it. Digs out borers. Prefers to wholesale fruit in orchard.

JOSEPH C. REA, Brenner, Doniphan county: Have been in Kansas twenty-seven years. Have 4000 trees six to twelve years old. I prefer for commercial orchard Ben Davis and Missouri Pippin; add, for family orchard, Minkler. Discarded Lawver because it did not bear. I prefer side-hill, clay loam, with a north slope. Prefer trees without forks, and plant a little deeper than in the nursery. I cultivate with the plow and cultivator until they begin to bear. I plant a young orchard to corn, a bearing orchard to clover, and cease cropping when they begin to bear. Windbreaks are not essential. I wrap my trees with corn-stalks to protect from rabbits. I prune to improve the fruit, and think it beneficial. Never dry apples. Think that if Jonathans are planted near other trees they are better, bigger, and fuller. Winesap and Chenango Strawberry are varieties adjoining mine. Do not fertilize; would not advise its use. Do not pasture orchard; not advisable. My trees are troubled with buffalo tree-hopper. I dig borers out. I pick by hand and sort from a table. I sort into three classes—first, the fairest and reddest; second, smaller and paler; third, rough and poor. I prefer three-bushel barrels to pack in; fill as full as possible, and mark with my name. I sell in orchard, also wholesale. Leave culls on ground. My best market is home; the buyers come and get them. I store in barrels, and find that Minkler and Mammoth Black Twig keep best. I got \$1000 for 805 barrels last year. I employ young men and boys, and pay \$1.25 to \$1.50 per day.

ELI HOFFMAN, Donegal, Dickinson county: Have been in Kansas nineteen years. Have 500 apple trees, nine years planted, made up of 150 Ben Davis, 150 Missouri Pippin, 75 Winesap, and 125 of summer and fall varieties. I prefer bottom land; don't want hilltop, unless level; don't want any slope; would subsoil the year before planting, then plant twenty-four feet apart each way the following year. Grow corn or potatoes the first four years, and after that, nothing. Cultivate up to nine years old; the disc and corn cultivator are good the first years; I keep it as clean as a California orange grove; cease cropping after four years. I think windbreaks are necessary, and would make them of a double row of mulberries eight feet apart. For rabbits I put wire screen around the trees.

I use the pruning-knife and saw to give air. I would not pasture an orchard. Have not sprayed, but intend to, with London purple.

E. M. GLASPEY, Nortonville, Jefferson county: Have lived in Kansas fourteen years. Have 700 apple trees from twenty to twenty-five years old. Prefer Ben Davis, Missouri Pippin and Winesap for market; and Winesap, Golden Sweet and Early Harvest for family use. I prefer bottom land with a north aspect, soil suitable for wheat is good for apples; would turn in cattle after the crop is gathered, and think it pays. When the bloom falls I spray with London purple. I pick in half-bushel baskets and place in large piles in the orchard. I sort into three grades; No. 1 is best, which I generally sell to shippers; No. 2 next, which I sell in the city to families or to dealers; the culls I peddle out, and also make into cider. My best market is Atchison. I shipped once to a commission house in Topeka, but it did not pay. I never dry any; sometimes I store for winter in bulk in the cellar, and find that Missouri Pippin and Willow Twig keep the best. I employ men and boys at seventy-five cents to one dollar per day.

W. H. TUCKER, Effingham, Atchison county: Has lived in Kansas thirty-eight years; has an orchard of 500 trees, 200 of them planted twenty years and 300 planted six years. Advises for commercial orchard Ben Davis, Gano, and Missouri Pippin, and adds to them for family orchard Early Harvest, Maiden's Blush, Genneting, and Jonathan. Has discarded Smith's Cider. Prefers rich, sandy upland with red clay subsoil, with a northeast slope. He planted vigorous four-year-old trees, first plowing, then twice harrowing; then furrow out deeply each way thirty feet apart, and set a tree at each crossing. He cultivates with ordinary tools from six to eight years, until trees begin to bear, growing corn, potatoes or beans in the orchard; then seeds to clover. Believes windbreaks essential and makes his of soft maple, ash, and walnut. For rabbits he uses Frazer's axle grease, and kills borers with knife. Prunes little until after the trees are fifteen years old; prunes only to give shape and keep from being too brushy. Uses stable manure and lime as fertilizers and believes it would pay on all soils he ever saw. Pastures his old orchard with hogs at certain times of the year, and says it pays. Is troubled some with insects, and sprays twice each year with London purple. Has not been fully successful. Picks in baskets and sacks. Makes two grades—selects and sound fair size. Packs only in barrels; often sells in orchard. For last few years has used a few culls for vinegar, and let the rest rot on the ground. Best market is at home. Has tried distant markets and made it pay. Never dries any, and for the last six years has stored none for winter. Prices have ranged from twenty to forty cents per bushel. Uses farm help at seventy-five cents to one dollar per day.

J. F. HANSON, Olsburg, Pottawatomie county: Have lived in Kansas thirty years; have an orchard of 1500 trees, ten and twelve years old. Use for commercial purposes Winesap, Jonathan, and Missouri Pippin. For family use I add Maiden's Blush and Early Harvest. My land is a black loam, in the bottom, with an east slope. I plow deep, then list a furrow each way, and plant at the crossing. I usually grow millet in the orchard for seven or eight years, and then—if anything—clover or orchard-grass. I believe windbreaks are essential, and would place on the north and west sides Osage orange or mulberry trees. For rabbits, I wrap my trees. For the borers, I use whitewash. I do not pasture. I have some insects, but have not sprayed. I pick by hand, and sort into two classes, according to size and quality. I retail my best in the orchard and else-

where; of the culls I make cider. I store for winter in barrels in the cellar; am successful in keeping Winesap, Jonathan, and Missouri Pippin, losing only about one-tenth. Prices have run from twenty cents to one dollar per bushel. For picking, I use boys from town.

WILLIAM J. HENRY, Lowemont, Leavenworth county: Been in Kansas twenty-seven years; have 2500 apple trees; 1600 bearing and 900 younger. For market varieties I use Ben Davis and Jonathan; for family orchard, Winesap, Rawle's Janet, Maiden's Blush, and Early Harvest. I prefer bottom land for Ben Davis and hilltop for Jonathan; northeast slope is best. The soil preferred for most apples should be clay, while for Ben Davis I prefer black loam. I plant good, healthy two-year-olds, twenty-four by twenty-four feet on the hill, and thirty by thirty feet in the bottom. I have grown root grafts with great success. I cultivate in corn for six years, with a diamond and shovel plow, with a single horse, and by all means avoid a turning plow. After this I grow weeds or clover, but use a mowing-machine. Windbreaks are essential here, and should be made of a heavy hedge or forest on the northwest. I wrap with brown paper for mice and rabbits. Use a knife on borers, which are the only insects that bother me. I prune to shape the tree when young, and to increase the quality of the fruit when older; it is beneficial, and pays. Winds in Kansas are more than sufficient for thinning purposes, and often thin to excess. I have tried apple trees in blocks of a kind, and also mixed, and can see no difference in fertility. I use stable litter, rotten straw, etc.; it is next to cultivation. I would always use such on thin soil, and on rich soil if it is not cultivated. I turn any and all kinds of stock in after gathering the fruit, and think it pays, but I would not allow any live stock in a young orchard. I am troubled some with canker-worm, flathead borer, and codling-moth. I spray from the shedding of the bloom until of the size of peas, using London purple, to perfect the fruit. I believe I have reduced the codling-moth some. For picking I use good careful hands, with baskets and ladders. We sort on a cull table in the orchard into No. 1 and No. 2. I prefer eleven-peck barrels, filled full enough to head without bruising, stencil the end and haul to market in a lumber wagon. I often sell in the orchard my best apples in barrels; the second grade I often sell in the orchard, too; third grade I peddle; culls I make into cider. My best local market is Lowemont; best distant market is Denver, Colo. I never dry any. I store in an out cellar covered with dirt, in barrels, and find Winesap keeps the best. I lose about one-tenth. Prices for the last four years have run from 75 cents to \$1.50 per barrel. I use the most careful men, and pay seventy-five cents and board, or \$1.25 without board.

CHAS. WARDEN, Leonardville, Riley county: I have lived in Kansas twenty-seven years; have an apple orchard of 300 trees, from five to sixteen years planted. For market I prefer Ben Davis, Winesap, and Missouri Pippin; and for family, Maiden's Blush, and some other varieties. I prefer hilltop with black loam and clay subsoil, with an eastern slope. I plant two- and three-year-old trees in deep furrows thrown out with a plow. I plant my orchard to potatoes and beans for eight years, using a cultivator, and cease cropping when the trees shade the ground; plant nothing in a bearing orchard. Windbreaks are essential; would make them of soft maple, Russian mulberry, or ash, two rows around the orchard, three rods from the apple trees. To protect from rabbits, I wrap the trees with stalks and straw. I prune my trees with a saw, so that I can get in to pick the fruit. I think it beneficial. I never thin the fruit while on the trees. I fertilize my orchard; think it has been beneficial, and would advise it on all soils. Do not

pasture my orchard. Trees are troubled with tent-caterpillar. I spray after the apples have formed, with London purple, to kill the insects. After picking my apples, I leave them in piles in the orchard until cold weather, when I carry them in. Sort into two classes—cider, and selling; peddle my best apples, and make cider of the second and third grades. Clay Center is my best market. Never dry any. I store some for winter on shelves eight inches deep, and am successful. I find Winesap keeps best. We have to repack stored apples before marketing, losing about fifteen per cent. I do not irrigate. Price has been seventy-five cents per bushel. I employ men at one dollar per day.

PHILLIP LUX, Topeka, Shawnee county: I have lived in Kansas thirty years. Have an apple orchard of 1200 trees from six to nine years old. For market I prefer Ben Davis, Missouri Pippin, Jonathan, York Imperial, and Grimes's Golden Pippin, and for family would add to the above Benoni, Maiden's Blush, Early Harvest, Red June, Duchess of Oldenburg, Early Ripe, and Yellow Transparent. Have tried and discarded Willow Twig, Smith's Cider, Kansas Keeper, Wagener, Talman Sweet and White Winter Pearmain on account of blight and other good reasons. I prefer clay upland and subsoil, with northeast aspect. I use only number one two-year-old trees, planted in furrows opened up with a plow, and deep enough to receive them without the use of a spade. I plant sixteen by thirty-two feet. I cultivate my orchard to corn for four or five years, using a hoe, plow, and five-shovel cultivator with one horse; cease cropping after four or five years; grow clover and weeds in a bearing orchard, mowing twice a year and let lay on the ground. Windbreaks are not absolutely necessary. For rabbits I find wood veneers to be best and cheapest; they come in blocks; turn one end to the sun or fire to dry; then put on coal-tar and stick this end in the ground. I prune a little during the first five years after planting, keeping the heaviest part of top to the southwest. It will always pay if judiciously done. I never thin my apples while on the trees. Do not pasture the orchard with anything but chickens; it pays in eggs. My trees are troubled with roundhead borer, fall web-worm, leaf-roller, and canker-worm, and my apples with codling-moth. Have not sprayed, but soon intend to, with London purple. I dig borers out with a knife. I pick apples in half-bushel baskets; sort into two classes, putting all fine, sound and good size in first grade. I pack in three-bushel barrels and send to market as soon as ready by railroad. I sometimes sell my apples in the orchard. I also wholesale and retail, and sell the second and third grades where I can get the most for them; feed the culls to stock or let rot. Have tried distant markets and found it paid. Do not dry any.

FAYETTE A. SMITH, Belleville, Republic county: I have lived in Kansas thirty-one years; have an orchard of 200 apple trees from six to eight years old. For commercial purposes I prefer Ben Davis, Winesap, and Missouri Pippin; and for family, Winesap, Missouri Pippin, and Rawle's Janet. I have tried and discarded Cooper's Early White; it is too tender. I prefer two feet of good soil on a hill; do not care what is below if drainage is good; think a northern slope best. I prefer fresh, vigorous, two-year-old trees with well-formed top, set in land plowed for two preceding years in deep furrows both ways; open holes with hoe, then tramp dirt well around roots. I cultivate my orchard with corn or potatoes for ten or fifteen years, using a small one-horse stirring plow, wrapping the ends of the singletree. Cease cropping when the trees get too large. Windbreaks are not essential, but think they might be beneficial to some kinds, on the south side, to protect from hot winds. Would make them of Russian mulberry or

willows. Any smell of blood or fresh meat will keep the rabbits off; I do not like wrappers, as they harbor vermin. I prune my trees some, cutting out small limbs to let in light; think it beneficial. I thin the fruit on my trees by knocking them off with a pole, if I can't do better, at any time; it pays when overloaded. I fertilize my orchard with stable litter; do not put it close to trees; think it beneficial if not too coarse; would advise its use on soils where it will not force too rank a growth. I pasture my orchard with growing calves, but do not think it advisable; it does not pay. My trees are troubled with tent-caterpillar, flathead borer, and leaf-roller; and my apples with codling-moth and curculio. I do not spray; but think it would be beneficial. I pick my apples from a common orchard platform ladder. Do not raise any apples for market. Do not dry or store any, or irrigate. Prices have been twenty-five to sixty cents in the fall, fifty cents to one dollar in the winter. Average about sixty cents per bushel for good apples. Dried apples have been five to seven cents per pound.

J. F. CECIL, North Topeka, Shawnee county: I have lived in Kansas twenty years. Have an apple orchard of 200 trees, six to eight years planted, three to four inches in diameter. I prefer for market Winesap, Grimes's Golden Pippin, York Imperial, and Missouri Pippin; and for family orchard Red June, Benoni, Summer Rambo, Grimes's Golden Pippin, Jonathan, Winesap, and Rawle's Janet. My orchard is situated on a hill. I prefer mulatto soil, with red subsoil. I prefer young, thrifty trees, planted in furrows made with a plow and subsoiler. I plant my orchard four to six years with any cultivated crop; if it is corn or potatoes I use an ordinary corn cultivator; at other times I use an Acme harrow. I cease cropping when the trees begin to bear, and then plant to clover. Windbreaks are essential; I would make them of Osage orange, evergreens, or any body of timber, placed so remote that the orchard is not deprived of its nourishment. For rabbits I wrap the trees, and use potash for borers. I trim my trees while young with a knife, to encourage low heads; it pays if done moderately. It pays to thin Winesap and Rawle's Janet while on the trees. I fertilize my orchard with stable litter; would advise its use on all soils. Do not pasture my orchard. Trees are troubled with canker-worm, tent-caterpillar, bagworm, flathead borer, buffalo tree-hopper, fell web-worm, leaf-miner, and leaf-crumpler; and my apples with codling moth and curculio. I have spayed with Paris green for the above-mentioned insects; am satisfied that I have checked them.

JAMES M. WILLIAMS, Home, Nemaha county: I have lived in Kansas nearly eighteen years. I have 400 apple trees, fifteen years planted, and of good size. I prefer bottom land, black soil, with clay and limestone subsoil, sloping a little to the south. I prefer to plant good three-year-old trees, twenty-four by thirty feet apart; I cultivate all the time with cultivator and harrow. I grow corn in the orchard from eight to ten years, and oats after that. I think windbreaks are essential, and would make them of native timber, planted south of the orchard. I prune with a knife and saw, and believe it makes the fruit larger and better; I never thin on the tree. I like to put plenty of stable litter and old straw at the roots of the tree in winter. I pasture with hogs after the oats come up; they eat all the windfall apples and thus destroy insects. Am troubled some with caterpillars, borers, and codling-moth. Have never sprayed any. I pick by hand in sacks, from step-ladders, and put in piles. We sort by hand into three classes—No. 1's and No. 2's for market, and No. 3 for the hogs. I sell my best by the wagon-load in the orchard; my seconds I sell the same way, but cheaper.

I never dry any. I store in the cellar, in barrels, for winter sales to winter dealers. I find the best keepers are Winesap and Rawle's Janet. Prices in the fall, forty cents; in the winter, seventy-five cents. I hire men for help and pay one dollar per day and board.

H. C. COOPER, Morganville, Clay county: I have been in Kansas twenty-eight years; have 300 apple trees, planted fifteen and nineteen years. The best for commercial purposes are Winesap, Missouri Pippin, Ben Davis, and Rome Beauty; for family use, Red Astrachan, Early Harvest, Grimes's Golden Pippin, and Winesap. I have tried and discarded Willow Twig; it rots on the tree, and, by the time it gets to bearing, dies. The Snow rots on the south side and dies. The Keswick Codlin is a good bearer but too short-lived. I prefer side-hill, sloping to the north, soil a black loam, without hard-pan or joint clay. I prefer trees two years old, limbs two feet from the ground and not too heavy top, set thirty-five feet apart, at the junction of furrows run out both ways with a lister. I grow nothing in an orchard. Do not cultivate. I simply keep down the weeds, and let the tree take care of itself. I don't think the roots should be troubled in Kansas. I believe windbreaks are essential; and would put them of box-elder on the north and west of the orchard. For protection against rabbits, when you first set your tree take a good handful of slough-grass long enough to reach to the first limb, tie at the top, in the middle, and bottom, and leave it on till it rots off; neither rabbits, borers nor sun-scald will trouble a tree thus covered. Cut out watersprouts; but never cut off a limb without good reason. Put stable litter around your trees in a circle for the first three years. Never pasture the orchard. Am troubled with some insects, and have never sprayed but four trees as an experiment; the apples did not rot or fall off. We pick by hand from a ladder, and sort and place in piles in the cellar, each kind by itself. I market my best apples at home, selling some in the orchard; the culls I make into vinegar. I store some for winter in bulk in a cellar cave, and find that the Winesap and Missouri Pippin keep the best. I pay fifty cents per day for help.

J. B. WILCOX, Muscotah, Atchison county: Have lived in Kansas thirty-five years; have 4000 trees seventeen years planted. Prefer Winesap, Missouri Pippin and Ben Davis for market, and would add Grimes's Golden Pippin, and Jonathan for family orchard. Have tried and discarded many varieties. I prefer a black loam, with clay subsoil, on a northern slope. I cultivate for six or eight years in corn, and then seed to clover. Do not think windbreaks are a necessity. I pasture my orchard with horses and cattle; do n't think it advisable, and do n't think it pays. I am troubled with canker-worm and round-headed borers. I spray with Paris green for canker-worm, and dig borers out with the knife. I sell my best fruit at wholesale, often in the orchard. With the poorest culls I do nothing. I find my best market right at home. Prices have ranged from seventy-five cents to two dollars per barrel. I pay three cents per bushel for gathering.

GEO. A. WISE, Reserve, Brown county: I have lived in Kansas twenty-nine years. Have an orchard of 22,000 apple trees; 150 are eighteen years old, the rest are twenty-four years old. I have the Ben Davis, Gano, Jonathan, York Imperial, Winesap, and Missouri Pippin, and for my own use add to the above Grimes's Golden, and some summer varieties. I have tried and discarded Willow Twig as short-lived, and Northern Spy for shy bearing. In this county I would

choose upland, northern slope, with black loam soil. Would plant two-year-old, sound trees, without fork, thirty-three feet apart each way, and three inches deeper than they grew in the nursery. I cultivate thoroughly, planting to corn from six to eight years. I use a disc harrow and one-horse, five-tooth cultivator; I then sow to red clover, and cease cropping when the limbs reach out far enough to prevent me passing through with the hay-rack. While I would not object to a windbreak on the south side, I do not think it necessary. I wrap my trees with grass and am not bothered with rabbits. I believe in pruning trees while young; I cut off limbs that do not stand at an angle of forty-five degrees, and thin out to prevent being top-heavy. I have never thinned apples on the trees, but believe it would pay. I fertilize the ground all over with stable litter. I believe it does no harm and pays to pasture the orchard with hogs. I have never sprayed any. I pick apples by hand from a step-ladder into half-bushel measures, and sort into three grades—first, sound, and not wormy; second, may be wormy, but otherwise sound; third, cider. I pack in barrels, and sell at wholesale, usually in the orchard. I sell the second-grade apples in bulk; make culls into cider and feed to horses and cattle. Never have tried a distant market. Never dried any. Sometimes store a few for winter in bulk in a cave; not satisfactory. Find that the Winesap and Missouri Pippin keep best. Some years apples keep better than they do others. Have never tried irrigation. Prices have varied from sixty cents to \$1.25 per barrel. I use all kinds of help, paying from seventy-five cents to one dollar per day.

H. M. RICE, Muscotah, Atchison county: Have resided in Kansas twenty-eight years. Have an apple orchard of 8000 trees—5000 one year planted, 500 five years planted, 1000 seven years planted, 500 nine years planted, 1000 ten years planted. Planted for commercial purpose Ben Davis, Missouri Pippin, and Grimes's Golden Pippin, and for family use advise Winesap, Grimes's Golden Pippin, Jonathan, Red June, Rawle's Janet, and Romanite. Declare Golden Russet and Sops of Wine no good. Use upland; prefer north or northeast slope; any good corn land will do. Plant good, thrifty two-year-old trees, eighteen feet apart north and south, and thirty-four feet apart east and west. Am trying 5000 root grafts. Cultivate with five-tooth cultivator with twenty-inch single-tree, and a mule; up to bearing age, with corn and potatoes as a ground crop; after that seed to clover. Do not think windbreaks essential for large orchards; would advise three rows of soft maples around small orchards. Use against rabbits a wash of equal parts carbolic acid and water. It pays to remove water-sprouts. Use all the barn-yard litter available. Pasture with horses and colts in winter only; it pays. Spray from the time the leaves appear until the apples are as big as hickory-nuts, to kill canker-worm, codling-moth, and leaf-crumpler. For borers, wash trees about June 1 with equal parts carbolic acid and water, and if any get in after that dig them out with a knife. Sort into firsts, seconds, and culls. Use barrels well shaken and pressed, marked with variety and name of grower. Usually wholesale as soon as picked. Make culls into vinegar when I cannot sell them in bulk. Never dried any, and put none away for winter except a few in boxes for family use. Find that Missouri Pippin, Rawle's Janet and Romanite keep the best. Prices run from \$1.50 to \$3 per barrel. Use men, women, and boys, and pay $1\frac{1}{2}$ to 2 cents per bushel for hand picking.

H. C. RIGGS, Wetmore, Nemaha county: Has lived in Kansas twenty-seven years; has an orchard of 400 trees, set from two to twenty years. Advises for market Ben Davis, Winesap, Missouri Pippin, and for family use adds Cooper's

Early White, Red June, and Jonathan. Has discarded Willow Twig and White Winter Pearmain, because both "rot on the trees." Prefers porous clay or loam in dry bottom, with north aspect. Plants two-year-old, low-top, fibrous-rooted trees with a spade, after marking out both ways with a plow. Grows corn and potatoes in orchard, and cultivates up to eight or ten years with double-shovel plow. Would put windbreaks of cottonwood or soft maple on southern exposure. Protects from rabbits by wrapping. Prunes with saw and chisel, and says it pays. Uses well-rotted stable litter while orchard is young. Thinks cautious pasturing with hogs or young calves would pay. Is troubled with some insects, but does not spray. Picks and sorts into three classes: "Winter storage," "immediate use," and "cider apples." Sells mostly in orchard. Dries only for family use. Stores in bulk, and finds that Ben Davis keeps best. Says that his trees that got the waste water from the well were much benefited. Price, about seventy-five cents per barrel.

P. S. TAYLOR, Eskridge, Wabaunsee county: Have been in Kansas thirty-two years; have 1100 trees planted eleven years, that are now thirty-two inches in circumference. I prefer for market Ben Davis, Jonathan, Missouri Pippin, and York Imperial, and for family use would advise Jonathan, Grimes's Golden Pippin, Winesap, and York Imperial. Have discarded Rawle's Janet, Cooper's Early White, and Smith's Cider, also Winesap as a market apple. Prefer a deep, sandy loam, with clay subsoil, bottom or slope land, with northeast aspect. Plant thrifty, medium-sized, three-year-old trees twenty feet apart north and south, and forty feet east and west. I cultivate for six years in corn and potatoes; then sow to clover, plowing this under every third or fourth year, using the Acme harrow run shallow. I believe windbreaks are beneficial, and would prefer two rows of white elms mismatched. I wrap the trunks of trees, for protection against rabbits. I believe in pruning out all watersprouts and crossing branches; it facilitates gathering and the fruit colors better. I have tried thinning on Missouri Pippins, Winesaps, and Romanites, knocking them off with a pitchfork. I believe in fertilizing orchards on all prairie soils with barn-yard litter. I pasture my orchard when the trees are vigorous and the soil not wet, with calves and pigs; I believe it pays if done with moderation. I spray after the petals fall, using Paris green for codling-moth, and believe I have reduced them. For borers I use a knife and wire. I pick by hand in half-bushel baskets and sort into three classes: perfect, medium size, and culls. We sort from bins in a light, airy shed, and pack carefully by hand into standard barrels, marked firsts and seconds, and haul to market on springs. I sell my second grade fruit to western wagoners; we feed culls to hogs and cows. We do best in our home market. For winter we store in bins in the cellar, and are usually successful. Prices have ranged from fifty cents to one dollar. For help I employ only my three sons, and give them an interest in the proceeds.

THOMAS ARBUTHNOT, Cuba, Republic county: Have been in Kansas thirty years. Have 6000 apple trees nine years old. I prefer two-year-old trees, five to six feet tall, planted after a lister run as deep as possible. I cultivate with the plow and disc, growing corn in the orchard for six or seven years; after that nothing. I believe in windbreaks. I prune a little. Never thin the fruit. Do not use any fertilizer on the ground, and never pasture the orchard. I do not spray, but use a torch every evening to burn the insects; one torch will draw the insects about 300 feet, and we think this better than spraying. [Such lights are liable to destroy as many beneficial as noxious insects.] I sell to wagons, as there is

sufficient demand here from the western counties to take in that way all that I have to spare. Have never dried any, nor stored any for winter. I do not irrigate. Prices have been, twenty-five cents for culls, and forty to fifty cents per bushel for everything else. My orchard is only commencing to bear fruit on all the trees.

ELBRIDGE CHASE, Padonia, Brown county: Have lived in Kansas thirty-nine years. Have 2800 apple trees thirteen years old, running from five to eight inches in diameter, made up of equal numbers of Ben Davis, Jonathan, Winesap, and Rawle's Janet. I would discard the latter. I prefer hilltop with deep vegetable or sandy loam. My trees are doing best on an eastern slope. I plant thrifty four-year-olds. I believe in cultivation with the plow and disc harrow until the trees shade the ground so that weeds cannot grow much. I grow corn for a few years, then clover for two years, after that no crop whatever. Have no use for windbreaks, and use lath two feet long stuck in the ground around the trees to protect from rabbits. I prune with a saw, knife, and shears, to keep the trees in good shape and not too brushy, and believe it pays. I do not believe it would pay to thin apples on the tree. I would not pasture my orchard. I do not spray. I gather in sacks hung over the shoulder, as for sowing grain. Sort into two classes, packed into three-bushel barrels, pressed in and marked with the name of the variety. I sell at wholesale, but never have sold in the orchard. Minneapolis, Minn., has been my best market. We use part of the culls for cider. Never dried any. Do not store any for winter, and do not irrigate. Prices have ranged at from one dollar to two dollars per bushel. I use men and boys, and pay from two to three cents per bushel for fruit left in baskets at foot of trees. For other work than picking I pay \$1.25 per day.

J. H. BATEMAN, Holton, Jackson county: Have lived in Kansas forty years. Have 900 apple trees; 200 have been planted twenty-five years, 700 have been planted four years. Have made more money out of Ben Davis than any other. For family use my choice is White Winter Pearmain and Rawle's Janet. I have tried and discarded Dominie and Winesap. I prefer hilltop, with northeast slope, and a deep, friable soil; hard clay is not good. I would plant two- or three-year-olds, in a deep furrow, preferably subsoiled. Would cultivate as long as it do n't cut the roots, with a two-horse cultivator, and would grow corn four or five years, then seed to clover. I believe windbreaks are very beneficial; would make them of walnut or maple. Osage orange is fairly good; all may be raised from young trees or seed. I wrap young trees in the fall with paper to protect from rabbits. I prune with the knife to prevent friction. Never tried thinning on the trees; believe it would be beneficial. Fertilizers make the trees thriftier, but cause the roots to run nearer the surface; consequently the trees suffer more in drought. I have pastured to a limited extent with calves and horses; hogs injure the trees. The worst insects I have are the flat-headed borer, which I cut out, and the curculio. Have never sprayed, but think I will. We pick from a ladder into pails or baskets and sort into two classes; we pick the best from the trees, and shake the others to the ground. I sometimes sell in the orchard; I wholesale when I can, but sell more to the buyers at the railroad station. I make some cider, and feed the balance of the culls to hogs. Our best markets are the apple buyers at Holton. Have never shipped any or dried any. I store only for home use, in boxes in my cellar, and find that Rawle's Janet and Romanite are the best keepers. I use farm hands at from seventeen dollars to twenty dollars per month.

JOHN GRAVES, Day, Washington county: Have lived in Kansas twenty-one years. Have an orchard of 6025 trees; 25 of these have been planted twenty years, 400 seventeen years, 1200 ten years, 400 seven years, 4000 two years. For market I grow Winesap and Ben Davis. For family use I add Missouri Pippin, Snow, and Early Harvest. Winesap best of all. I prefer hilltop, as the gophers are bad on the bottom. I prefer a black soil with lots of gravel and small stones in it. Believe that north and east slopes are best. I plant two-year-old trees with short bodies, twenty-five feet apart each way. I cultivate with corn for about ten years, using the stirring plow and cultivator. I believe windbreaks are essential, and would use four rows of cherry trees set close together, or a row of hedge or box-elder, mainly on the south; some on the north. For protection from rabbits I tie corn-stalks around the trees, and keep them on for three or four years, winter and summer. I prune some with the pocket-knife and saw. I do not thin the fruit unless I think the limbs are going to break. I would use no fertilizer unless the soil is very poor. Never pasture the orchard. I sprayed one year with London purple, using a barrel with a pump in it. I could not see that it did any good, so I let them go. I pick in buckets from a step-ladder. People come from the west with wagons and take the apples right out of the orchard, and they don't sort much. I make some culls into cider and let the rest lay under the trees and rot. The price last year was seventy-five cents per bushel, and the year before thirty-five cents. I store a few for winter in thin layers, one above another, in a rack in the cellar, and am successful. Winesaps keep the best. For picking I use good careful men at one dollar per day.

GODFREY FINE, Maxson, Osage county: Have lived in Kansas twenty-nine years. I have 700 trees planted, five, ten and twenty-seven years. For market I use Missouri Pippin and Ben Davis; for family use I plant Early Harvest, Maiden's Blush, Lowell and Jonathan for summer, and Missouri Pippin and Winesap for winter. If I were putting out now I would only plant Missouri Pippin and Winesap. I prefer bottom, and such soil as has formerly been brush and timber land. A part of my orchard slopes a little to the south. I plant thrifty two-year-olds, with the top leaning to the southwest. I cultivate until they begin bearing; the plow is as good a tool as any, but care must be taken not to injure the roots. The best crop is buckwheat or potatoes; I have had strawberries and blackberries in the orchard, but do not consider it best; I cease cropping after they come into bearing. I believe in windbreaks; I do not know what would be best; mine is protected by natural forest-trees and Osage-orange hedge. To protect from borers, I use a wash with lye or strong soap-suds. I tie corn-stalks around young trees to protect from rabbits. I believe it pays to prune with the saw to improve the quality of the fruit. I think stable litter is good for old orchards, but should not be put close up around the body of the tree. I should pasture very little, as stock of all kinds destroy the trees and injure the fruit. I have sprayed little, but cannot say much about it. I pick by hand, and do not pack at all, as those that I do not find a market for here at home I sell to shippers. I sell many in the orchard, and when there is a full crop I sell to shippers and they grade and mark them. I sell culls for cider when there is a call for them. I tried drying, but did not find it profitable. I do not store any apples for winter, as I have no good place. Prices per bushel have ranged from twenty-five to fifty-five cents. I use men for help, and pay seventy-five cents per day.

JESSE WOLVERTON, Barnes, Washington county: I have lived in Kansas twenty-three years; have an apple orchard of 6000 trees, five to twenty-one years

planted. For commercial purposes I prefer Ben Davis, Missouri Pippin, Winesap, Rawle's Janet, and Jonathan, and for family orchard would add Early Harvest, Oldenburg, and Smith Cider. Have tried and discarded Willow Twig, Lawver, Talman's Sweeting, Stark, Wagener, Missouri Superior and Red Astrachan on account of blight and shy bearing. I prefer hilltop or bottom with a porous subsoil which is reasonably rich. My trees planted on hard-pan are dying. I prefer two-year-old, straight, thrifty trees, planted in land prepared as for corn. I cultivate my orchard to corn (once to broom-corn) as long as the corn does well, using a double shovel and a twelve-inch plow. I sow bearing orchard to oats, one bushel to the acre, and let stand. Cease cropping after seven or eight years. To protect the trees from rabbits I wrap with long grass. I prune some to form heads two or three feet from the ground, and cut all watersprouts with a knife; but do little of this until the trees are twelve years planted. Have thinned apples on trees; it does not pay. My trees are in mixed plantings. I fertilize my orchard with all the barn-yard litter I can get, and think it beneficial. A neighbor fertilizes his orchard very heavily and receives splendid crops. I pasture six acres of my orchard with hogs; they keep it well cultivated; have not thought it an injury yet. No orchard ought to be seeded to grass in this county. My trees are troubled with canker-worm, tent-caterpillar, and leaf-crumpler; my apples with codling-moth and gouger. I sprayed twice last year with London purple, one or two pounds [?] to a barrel of water, before and after they blossomed; it was an utter failure. When the worms appeared I increased the amount to three pounds to the barrel, without any effect. [This must have been poor London purple.—SEC.] I gather my apples in sacks with a hoop in the open end; then put on the sorting table, using bushel boxes and a wagon with a plank platform to haul them on. I sort into three classes: firsts, seconds, and culls. Sell firsts in orchard to Ryan & Richardson; sell second and third grades to teams. Make cider of the culls and those we cannot sell. My best markets are north and northwest. I never dry any. I store from 5 to 700 bushels in a basement under granary, and am fairly successful; find Ben Davis and Rawle's Janet keep best. Do not irrigate. Prices have been from twenty-five to seventy-five cents per bushel. I employ men, and pay from fifty cents to one dollar per day.

THEODORE OLSEN, Green, Clay county: I have lived in Kansas thirty years. Have an apple orchard of 200 trees, fifteen feet high, eighteen years old. I prefer for commercial purposes Ben Davis and Winesap, on second bottom, black soil, with a northeast slope. I plant three-year-old trees, not very deep, and cultivate my orchard to corn, using a cultivator run very shallow every year, and cease cropping when they begin to bear; then plant nothing. Windbreaks are essential here; I have trees planted around my orchard. I protect from rabbits by wrapping the trees with corn-stalks. I never prune, and do not thin the fruit on the trees. I fertilize my orchard with straw, and would advise its use on all soils. I do not pasture my orchard. My trees are troubled with flathead borers and leaf-crumplers, and my apples by gouger. I spray with Paris green in June; have not reduced the codling-moth. Pick my apples; sort into two classes, pack in bushel boxes, sell in the orchard, also retail; I make cider of culls. My best market is Green. I never dry any. I store some in boxes in a cellar, and am fairly successful; I find Ben Davis keeps best. We have to repack stored apples before marketing, losing about ten per cent. Do not irrigate. Prices have been from twenty-five cents to one dollar per bushel.

HARRY L. BROWN, Muscotah, Atchison county: I have lived in Kansas twenty-two years. Have an apple orchard of 150 trees, ten to twenty-five years old. For market I prefer Ben Davis, Winesap, Jonathan, Missouri Pippin, and Grimes's Golden Pippin; and for family orchard Maiden's Blush, Early Harvest, Red June, Smith's Cider, and Rambo. I prefer hilltop, with a deep, sandy loam, and a gravel subsoil, northeast slope. I prefer two-year-old, straight, thrifty trees, carefully set, 30x35 feet. I plant my orchard to corn, potatoes, beans and garden-truck for ten or twelve years, using a one-horse cultivator between the rows and around the trees, and cease cropping after twelve or fifteen years; plant strawberries or small fruits in a bearing orchard. Windbreaks are essential; would make them of two rows of evergreens planted around the orchard. I trap the rabbits, and wash and cut out the borers. I prune to thin and keep the tree in shape; think it beneficial, and that it pays. I do not thin the fruit while on the trees. My trees are in mixed plantings. I fertilize my orchard with horse and cow-stable litter; think it beneficial, and would advise its use on all soils, unless very rich. I pasture my orchard with nothing but chickens; it is not advisable; does not pay. My trees are troubled with flathead and twig-borers, leaf-rollers and crumplers; and my apples with codling-moth and curculio. I do not spray. I pick my apples from ladders into baskets and sacks, and sort, as I gather them, into three classes: perfectly sound, second best, and culls. I pack in baskets and boxes. I retail and peddle my apples; feed the culls to stock. My best markets are near-by towns; never tried distant markets. We sun-dry some, and pack in sacks and boxes; we find a ready market for them; it pays. Am successful in storing apples for home use in boxes and bins in a cellar, and find Ben Davis, Winesap, Rawle's Janet and Smith's Cider keep the best. I have to repack stored apples before marketing. Do not irrigate. Prices have been from forty to fifty cents per bushel, and dried apples five cents per pound. I pay men eighteen to twenty dollars per month, or one dollar per day.

F. W. WILCOX, Corning, Nemaha county: I have resided in the state twenty-three years; have an apple orchard of seventy-five trees, all sizes and ages. For market I prefer Ben Davis, Winesap, and Wealthy. I prefer a dark, loose soil, on a hillside with a north and east slope. I prefer good, healthy three-year-old trees, set in holes dug two feet deep and three feet across. I plant my orchard to sweet corn, using a cultivator, and cease cropping when I think necessary and seed down to red clover. Windbreaks are essential—would make them of Osage orange. I prune my trees with a saw to give shape; I think it pays. I do not thin the fruit while on the trees. I fertilize my orchard with rotten stable litter, but would not advise its use on all soils. I pasture my orchard with horses, and think it advisable, and that it pays. My trees are troubled with canker-worms, tent-caterpillar and flathead borer. I do not spray. I pick my apples by hand in pails. Sort into three classes—first, second, and cast out. I do not dry any. I store a few for winter market. I do not irrigate.

JAMES ANDERSON, Leonardville, Riley county. I have lived in Kansas seven-teen years; have an apple orchard of 200 trees from one to sixteen years old, four to sixteen feet high. For market I prefer Winesap, Missouri Pippin, Jonathan, and Ben Davis, and for a family orchard Early Harvest, Missouri Pippin, Winesap, Jonathan, and Ben Davis. I prefer bottom land with black loam and clay subsoil, with a southern slope. When setting trees, I dig holes four feet in diameter and three feet deep; put black loam in the bottom for the roots. I plant my orchard to potatoes for three or four years, using a plow. I cease cropping

at the end of this time, and mow, and leave everything on the ground. Sow red or white clover in a bearing orchard. Windbreaks are essential on the north and south sides of the orchard; would make them of maple, cottonwood, or Osage orange. I have Osage orange on the north and a creek with native timber on the south. For rabbits I wrap the trees. When I see a black spot on a tree I hunt for and dig borers out. I prune off all the interfering branches and water-sprouts. I do this for fruit; it pays. I do not thin the fruit while on the trees. I keep the varieties together when planting. I fertilize my orchard by putting stable litter a foot thick on the north side, which is the highest, and when it rains the liquid from it runs all the the way down and fertilizes the trees. I think it beneficial, and would advise its use on all soils. I do not pasture my orchard. It is not advisable, and does not pay. My trees are troubled with canker-worm, and my apples with codling-moth. I have sprayed with all the sprays recommended, and think I have reduced the codling-moth a little. I pick my apples by hand from a step-ladder, and sort into two classes—sound, wormy and windfalls. Put the sound ones in the cellar; make cider of the others. I sell apples in the orchard, mostly at retail. They sell the best in town in the winter. My best market is in towns west of here. I have tried distant markets, but it did not pay. I do not dry any. I store a few apples in boxes, barrels, and bulk, in a cellar. Those that keep best are Winesap, Missouri Pippin, Ben Davis, and Jonathan. Have to repack stored apples before marketing; lose about ten per cent. The average price has been fifty cents per bushel. I employ men at twenty dollars per month.

F. A. SCHERMERHORN, Ogden, Riley county: I have lived in the state thirty-eight years. Have an apple orchard of 4000 trees from twelve to thirty-seven years old. For market I prefer Ben Davis, Winesap, Missouri Pippin, and Jonathan; and for a family orchard Winesap, Rawle's Janet, Missouri Pippin, Maiden's Blush, and Early Harvest. I have tried and discarded Willow Twig and Smith's Cider on account of blight; and McAfee, Snow and Lawver on account of shy bearing. I prefer rolling land having a clay loam and clay subsoil. I prefer two-year-old trees, with heads twenty inches from the ground, set in the spring, about two rods apart. I cultivate all the time, even in bearing orchards, using an Acme harrow, planting corn; cease cropping after four years; put nothing in a bearing orchard. Windbreaks are not essential if the orchard is large. For rabbits I wrap the trees. I dig borers out with a knife. I prune my trees, and think it pays. I do not thin the fruit while on the trees. My trees are planted in blocks—800 Ben Davis in one and 700 Missouri Pippins in another; all bear well. I fertilize my orchard some, but not much. I think it would be beneficial on poor soil, but would not advise it on all soils. I pasture my orchard with horses after the fruit is gathered; can't see any harm. My trees are troubled with canker-worm and root aphid, and my apples with codling-moth. I spray as soon as the bloom falls, and two or three times afterward, with arsenic, for insects. Think I have reduced the codling-moth. I wash young trees twice during the summer season with diluted soft soap for borers. Pick my apples by hand, and sort into two classes. I pack in the standard apple barrel, fill with a head press, mark with variety and grade, and haul to depot on wagon. I sometimes sell apples in the orchard by the wagon-load. I ship my best apples, and sell the culls for what I can get. My best market is west. Have tried distant markets and found it paid. I do not dry any. I am successful in storing apples in barrels; Ben Davis and Missouri Pippin keep best. I do not irrigate. Prices last fall were two dollars per barrel or fifty cents per bushel to wagoners. I employ men at one dollar per day and board.

A. CHANDLER, Argentine, Wyandotte county. Have lived in the state twenty-two years; have an apple orchard of 400 trees from one to nine years old. For market I prefer Jonathan, Winesap, Missouri Pippin, Ben Davis, and York Imperial; and for family orchard Huntsman's Favorite, Maiden's Blush, and Jonathan. Have tried and discarded Grimes's Golden Pippin and Smith's Cider on account of blight. I prefer hilltop, with a clay soil and a light subsoil, and an east slope, as it will get the morning sun and no southwest winds. I prefer two-year-old trees five to six feet high, well branched, set twenty-eight by thirty feet; I also have some twenty by thirty feet. I plant my orchard to corn, potatoes, tomatoes and cabbage for seven years, using a cultivator and harrow (I like the Acme and spading harrow). Cease cropping after seven years; plant bearing orchard to blackberries and raspberries, but this is not advisable; clover or cow-peas are better. Windbreaks are essential on the prairie; would make them of a double row of Osage orange or evergreens, on the south and west. For rabbits I wrap the trees with paper or veneering, and for borers I mound the tree up. I prune a little with my pocket-knife to remove dead and crossed limbs; it does not pay to saw and chop. I thin my fruit by hand when the crop is heavy, not later than July 15. My trees are in mixed plantings. I fertilize my orchard with ashes and bone-meal; both are beneficial, but not necessary in good potash soils.

I pasture my orchard with six-months-old pigs—think it advisable in an orchard that is over four years old. My trees are troubled with canker-worms, round- and flathead borers and tent-caterpillar, and my trees with codling-moth, curculio, and gouger. I spray with London purple and Paris green, using a hand pump. For borers I wash the trees with whale-oil soap, carbolic acid, and sulphur, and then mound the trees up. I pick my apples in baskets, from a ladder wide at the bottom and narrow at the top, and leave the apples in the orchard four to six weeks, then sort into three classes, from a padded table 5x12 feet, sloping; pack into twelve-peck barrels, mark with variety, and haul to market on a spring wagon. Sometimes I sell apples in the orchard at retail; pack my best apples in one-peck baskets for stand trade, my second grade in barrels. Feed the culls to the hogs; cider does not pay. My best market is Kansas City. Have tried distant markets, but it did not pay—too great freight and commission charges. I am successful in storing apples in barrels in an earth cave five feet deep, earth sides and roof; keep it open when not freezing; apples can be stored in bulk by leaving a space of six inches at the sides and bottom. Jonathan and Gano keep best. I have tried artificial cold storage and lost fifteen per cent. of my apples. I found it too expensive and unreliable. I have to repack the stored apples before marketing, and lose from fifteen to forty per cent. of them. I do not irrigate. Prices have been: Jonathan, \$3 to \$5 per barrel; Ben Davis, \$2.25 to \$3 per barrel. I employ men mostly, at from \$1 to \$1.25 per day.

STEPHEN STOUT, Axtell, Marshall county: I have lived in the state nineteen years; have an apple orchard of 800 trees twelve to fifteen years old. For market I prefer Winesap, Ben Davis, Jonathan, Maiden's Blush, Cooper's Early White, Duchess of Oldenburg, and Huntsman's Favorite; and for family orchard, the first five varieties mentioned. Have tried and discarded Willow Twig and White Winter Pearmain, because the trees are not healthy. I prefer hilltop, with a black loam, and a clay subsoil having a reddish color, and a northeast slope. I prefer two-year-old, low-head, heavy, stocky trees, set in big holes, leaning the tree a little to the southwest; fill the hole half full, and then pour in a pail of water and fill up with earth. I have always plowed and cultivated my orchard, but I will have to quit soon, as the trees are getting too large. I use a stirring

plow, spring-tooth cultivator, and a harrow. Plant corn in a young orchard, and leave the stalks standing all winter; cease cropping after ten or twelve years; grow great big weeds in a bearing orchard, and plow them under in July. Wind-breaks are essential on the south and west sides of the orchard; would make by planting Osage orange seed very thick, and tend well for three years. For rabbits I paint the trees with a mixture of sulphur, soap and lard the first fall after planting, then every alternate year for three or four times; it will also keep off insects, mice, and bark-louse, and the trees will be slick and smooth, with no place for insects to harbor. I prune very little; keep out watersprouts, and let the sun into the top. I do not thin the fruit while on the trees.

My trees are in mixed plantings, but cannot see any benefit from it. I fertilize my orchard by plowing under the green weeds. I think a vegetable mold is what the trees require; think it beneficial, and would advise it on all soils. I pasture my orchard in the spring with sows and pigs; think it advisable, and that it pays. Codling-moth troubles my apples. I spray right after the blossom falls, and a few days later, with London purple, for the codling-moth, and we are getting away with him. For borers and other insects I allow the birds in the orchard, and do not allow the boys to go in with guns, or disturb them at all. I pick my apples by hand from a step-ladder, and pile them under the tree. I sort in two classes from a long, wide, sloping board with sides. I pack in barrels from the piles in the orchard. Wagons come from the west and buy the apples from the orchard at wholesale; sell the second grade to apple peddlers; make cider for vinegar of the culls. My best market is at home; never have tried distant markets. Do not dry any. I store apples for our own use, and have apples the year round. The Little Romanite keeps best. I do not irrigate. Apples wholesale at twenty-five cents per bushel in the orchard. I employ men at \$1.25 per day.

I had twenty-four very fine Siberian crabs—Hyslop, Transparent, and Whitney. They were affected with blight. Nearly all of the Siberian trees were dead from the effects of it, and one day, while in the orchard watching the movements of the birds and boys, I saw a striped woodpecker fly to one of the trees, and he found what he supposed to be a grub, but when he got through the bark he was very much disappointed, wiped his bill, and flew to another tree, where he continued to wipe and clean his bill; so I went to the tree mentioned, and found the bark very loose and sour where he had punctured it. I compared the smell and taste with the blighted twigs and found them the same. I cut the bark that was loose from the tree, and found the rapid growth of the bark and the flow of the sap had bursted the bark from the wood, and this sap had soured and been taken up by the other sap and poisoned the ends of the new growth; hence, it blighted. It was sap poison, like blood poison. I then used the knife freely, splitting the body and limbs. I saved twenty out of twenty-four of the trees. I then went over the orchard and cured all the trees in one season; never been bothered since. The woodpecker taught me a lesson, and I relate it to show the value of birds in the orchard.

A. C. MOORE, Wanamaker, Shawnee county: I have lived in Kansas thirty-three years; have an apple orchard of 400 trees, from twelve to seventeen years old. For market I prefer Winesap, Jonathan, Missouri Pippin, and Ben Davis; and for a family orchard Red Astrachan, Early Harvest, Maiden's Blush, Smoke-house, and Winesap. Have tried and discarded Tulpehocken; it rots on the tree and will not keep. I prefer bottom land, with sandy loam and clay subsoil, and a north slope. I prefer two-year-old trees, with full top and roots, set fifteen inches deep, in furrows checked with the plow; plant where furrows cross. I plant my

orchard to corn eight years, using a plow, harrow, and cultivator; cease cropping at the end of this time and seed to clover. Windbreaks are essential on the south; would make them of Osage orange fifteen rods distant, to protect the orchard from the hard and hot south winds. For rabbits I wrap the young trees with paper. I prune my trees after they are eight years old, with the saw, to give light and thin the top. I think it beneficial. I do not thin my apples; enough fall off. I fertilize my orchard by mowing the clover, and think it beneficial to young trees, and would advise the use of clover fertilization on all soils. I do not pasture my orchard; is not advisable. My trees are troubled with borers, and my apples with some insect that stings them and causes them to fall off. I do not spray. I pick my apples by hand with care. Sort into two classes, pack in barrels, in layers, by hand, mark with variety, and haul to shipping place or market in lumber wagon. I wholesale my best apples; make vinegar of the second and third grades and culls. Topeka is my best market; never tried distant markets. I do not dry any. I am successful in storing apples in barrels in a cellar; I also bury some. I find Romanite keeps best. I have to repack stored apples before marketing, losing about one-eighth of them. I do not irrigate. Price has been fifty cents per bushel.

THOMAS BUCKMAN, Topeka, Shawnee county: I have lived in the state twenty-nine years. Have an apple orchard of 1300 trees from six to twenty-seven years old. For market I prefer Ben Davis and Jonathan; and for family orchard Rare Ripe, Maiden's Blush, and Winesap. I prefer black soil with a porous subsoil, and a northeast slope. I prefer two-year-old, small-size trees, with good roots, set in holes dug with spade in well-cultivated ground. I cultivate my orchard six years with a five-tooth cultivator; plant corn in a young orchard, and cease cropping when six years old, and sow clover in the bearing orchard. Windbreaks are essential; would make them of Osage orange, by setting the plants twelve inches apart. For the rabbits I use traps and wrap the young trees with corn-stalks. I dig the borers out with a knife. I prune to remove crossed limbs and to keep the tree well balanced; I think it pays. I do not thin the fruit while on the trees. I do not fertilize my orchard, but think it would be beneficial on all soils. I pasture my orchard with hogs, but do not think it advisable; it does not pay. My trees are troubled with roundhead borers, and my apples with codling-moth and tree-cricket. I spray, after the blossom falls, with London purple. Pick apples into a sack over the shoulder from a slide ladder; sort under the tree, and put the best in crates made to hold one bushel level full; we let them remain in the shade of the tree until danger of freezing; then sort and store in the cellar, one box on top of another. I sell apples in the orchard, wholesale and retail to customers in Topeka; make cider of the second and third grades, and give the culls to hogs. Topeka is my best market. Have tried distant markets, but they do not always pay: I do not dry any. I am successful in storing apples in bushel crates. I find Rawle's Janet and Winesap keep best. I have to repack stored apples before marketing, losing about one-fifth of them. I do not irrigate. Prices have been from thirty cents to one dollar per bushel.

M. SANDERS, Broughton, Clay county: I have lived in Kansas thirty-eight years. Have an apple orchard of 400 trees, three to ten inches in diameter. For market I prefer Ben Davis, Winesap, Grimes's Golden Pippin, and Red Astrachan; and for family orchard Ben Davis, Winesap, and Missouri Pippin. I prefer bottom land having a sandy subsoil, and a southeast slope. I prefer two-

year-old, low-headed trees. In the spring I open deep furrows both ways with a plow, and plant the trees at the cross, fill the hole with good soil. I cultivate my orchard for six or eight years, using a common plow till four years old, then use a shovel plow, and plant early corn, potatoes, etc., in the young orchard; cease cropping after six or eight years; plant nothing in a bearing orchard, but keep up shallow cultivating with a disc or plow. Windbreaks are essential; I would make them of three rows of box-elder or Osage orange. I prune with a small saw or knife, to thin the top. I fertilize my orchard with yard litter and ashes, scattering it all over the ground; would advise it on all soils. I have pastured my orchard with hogs, but have quit it. I now pasture with cows; I tie their heads down, but do not think it advisable; it does not pay. My trees are troubled with tent-caterpillar, bud moth, and twig-borers, and my apples with codling-moth. I do not spray. I pick my apples by hand in a basket, and sort into two classes. Sell my apples to storekeepers and Indians; make cider and vinegar, and give away the second and third grades; feed the culls to the hogs and cattle. My best market is at home; never tried distant markets. Don't dry any. I have stored apples in boxes and barrels, and find Ben Davis and Winesap keep best. I have to repack stored apples before marketing, losing one-third to one-half of them. Do not irrigate. Prices have been from twenty cents to one dollar per bushel.

JOHN REED, Oak Hill, Clay county: I have resided in the state twenty years; have an apple orchard of 100 trees six years old. For market I prefer Ben Davis and Winesap; and for family orchard add Jonathan and a few early varieties. I prefer low land with a porous subsoil, and a northeast slope. I prefer two-year-old trees with branches one foot from the ground. When setting I dig big holes and loosen up the subsoil about a foot. I find this gives the best satisfaction. I have always cultivated my orchard, and intend to do so three or four years longer; I plow twice a year—in spring, and the middle of June; I keep the ground well stirred. I planted corn the first three years, listed it in, but would not recommend it, as the trees will do better if the land is plowed. Windbreaks are essential on the south and west sides of the orchard; would make them of two rows of cottonwood trees planted zigzag with one another. For rabbits I wrap with corn-stalks. I dig borers out and wash the trees with lye water twice a year for the first three years; it keeps the tree nice and clean and the borers out. I prune my trees, by cutting out the limbs that cross, and to keep the trees from leaning to the north, and it pays. I fertilize my orchard with decayed corn-cobs. I think it beneficial, and would advise it on all soils, as I think too much straw mulching is an injury to the trees when they get old. I do not pasture my orchard; it does not pay. My trees were troubled with canker-worms last spring. I do not spray. My best market is in the neighborhood. Prices last fall were fifty to sixty cents per bushel.

GEO. R. BARNES, Chapman, Dickinson county: I have lived in Kansas twenty-seven years; have an apple orchard of six acres old enough to be at their best. For market I prefer Ben Davis, Missouri Pippin, Jonathan, and Winesap, and for family use Early Harvest, Red June, Maiden's Blush, and Missouri Pippin. I prefer a low bottom with a black loam, and a north slope. I prefer two-year-old, well-balanced trees, set in holes large enough to receive them, twenty-four by twenty-four feet. I cultivate my young orchard to corn and potatoes, using a disc harrow, and cease cropping when they begin to bear. I plant nothing in a bearing orchard. Windbreaks would be beneficial on the south to protect the

orchard from the hot south winds. I would make it of walnut trees, because they sap the ground the least. To protect them from the borers, I leave the branches low down, and when we see any sawdust I dig him out with a knife. I prune very little with knife and saw to balance the trees. I do not thin the fruit on the trees. Some say if you expect to get a load of apples from a tree you must give it a load of manure every time it bears, and I think this is right, but do n't put it too close to the tree. I pasture my orchard with nothing but poultry; it is not advisable; it makes the ground too hard. Codling-moth troubles my apples very much. I do not spray. I sell apples in the orchard; peddle the best ones; make cider and vinegar of the culls. Do n't dry any for market—just enough for family use. Prices have been from forty to seventy-five cents per bushel.

A. M. ENGLE, Moonlight, Dickinson county: I have lived in Kansas nineteen years. Have an orchard of 600 apple trees ten to eighteen years old. For commercial orchard I prefer Ben Davis, Rawle's Janet, Missouri Pippin, and Wine-sap. I prefer bottom or low land with a dark loam, and a north or northeast aspect. I prefer stout, low-headed, two-year-old trees, planted sixteen or eighteen feet east and west and thirty or thirty-two feet north and south. I think an orchard ought to have as much cultivation as a corn-field. I grow early corn in my young orchard, using an Acme and cutaway harrow, and cultivate as for corn. I cease cropping when fairly bearing. Plant nothing in a bearing orchard unless for fertilizing, but keep cultivating. Windbreaks are essential; would make them of evergreen, box-elder, Osage orange, maples, cottonwood, etc. For rabbits I rub the trees with axle grease, or tar and fish oil, or old lard, mixed; apply with a cloth. For borers I wash with lye or strong soap-suds. I prune my trees severely when planting, and watch them for several years, and cut out all branches that rub or crowd, and cut out buds so that the tree will not have too many limbs for foundation; I think it pays. I thin the fruit while on the trees; begin early when the trees are full, and continue all through the season, whenever I see imperfect fruit; think it pays big. My trees are mixed plantings. I fertilize my orchard with well-rotted stable litter and wood ashes; I would especially advise the use of wood ashes. I pasture my orchard very little; would put hogs in if the limbs were not too low and full of apples; I think it would pay. My trees are troubled with flathead borer and canker-worm, and my apples with codling-moth. I intend spraying this year with Paris green and London purple for the worms, and Bordeaux mixture for blight and fungus diseases, as soon as the blossoms fall.

In picking I use foot ladders and one-half-bushel baskets, unless the variety is very hard; then I use sacks. Sort into three classes. Pack in barrels shaken and pressed down, then headed, and marked with name of variety, and haul to shipping point on wagon. Sell some apples in the orchard; let the grocer have the best to sell on commission; sell second and third grades the best way I can; make cider of culls. My best market is at Abilene; never tried distant markets. Dry only for home use. Am successful in storing apples in barrels and tight boxes, in a cave; find Winesap and Rawle's Janet keep well till June. Put my apples in the cave when the weather is cold, and keep it open cold nights, but am careful to not let it freeze. Think it best to repack stored apples when kept late. If they are well managed you will not lose five per cent., probably not two per cent. Do not irrigate, but would if I had water facilities. Prices last fall were from forty to fifty cents per bushel in the orchard, but the apples I kept over netted me \$1.25 to \$1.35 per bushel. I employ men and women; think

women best and cheapest for sorting. Pay fifty, sixty and seventy-five cents per day.

I do not consider myself a successful horticulturist, but believe, if I had known as much about the nature or necessity of the orchard when we came to Kansas nineteen years ago as I do now, I could have made a success of it, even here in central Kansas. I would especially say that I do not believe there can be success with an orchard exposed on upland. There might possibly be some success as a family orchard, with a good windbreak planted around it, especially on the south side, but I would not take ten, twenty or thirty acres of exposed upland, with apple trees enough to plant it, as a gift, if I must plant and tend it, for the produce of it for ten or more years. I do not know of a single such orchard that is worth having. I would advise selecting low ground, sloping north and east, with an elevation or good timber protection on south and west; land inclining to bottom or good "draw." My belief is that, with a good selection of varieties, and the proper kind of land and location, apple-raising could be made quite profitable here. Keeping the apples in cellars is a mistake; a good cave kept as cold as possible without freezing is far better. I think apples should be placed on the north side of some shed or building before being put in the cave, and kept cool, and put into cave before freezing. Last fall I sold my choice apples at the orchard at from forty to fifty cents per bushel. I kept some in barrels in the cave. They were in good demand later. About the holidays I got \$1.25, and since then \$1.35. I had a contract with a grocer to sell them for fifteen per cent., and they netted me as above. I have some in very fine condition in my cave yet [April 27]. I still open the cave on cold nights.

THOMAS E. TAYLOR, Pearl, Dickinson county: I have lived in the state seventeen years. Have an apple orchard of seventy trees, fifty of which are twelve years old, and the other twenty are eighteen years old. I prefer Maiden's Blush, Missouri Pippin, and Winesap. Have tried and discarded Lowell, Jonathan, Grimes's Golden Pippin, and Willow Twig, on account of blight. I prefer bottom land having a sandy soil and a clay subsoil, with a north slope. I prefer two-year-old healthy trees, set in ground which has been plowed very deep. I water the tree well when I plant it. I have cultivated as long as it was possible to get between the trees. I generally use a common plow and disc harrow during the summer, where I have no crop in. I grow corn, Kafir-corn and potatoes in a young orchard. Cease cropping my orchard when twelve years old. I mow the weeds with a machine. I think windbreaks a benefit; would make them of box-elder, ash, or red cedar. I use a pruning-knife on my trees every year, leaving the branches quite thick on the south side. I think it pays. Never have thinned the fruit on the trees. I fertilize my orchard every two or three years with stable litter. I think it beneficial. I do not pasture my orchard; it is not advisable, does not pay. Do not spray. Prices at picking time are forty to fifty cents per bushel.

H. DUBOIS, Burlingame, Osage county: I have lived in Kansas forty-one years. Have an orchard of fifty apple trees from ten to twenty years old. For market I prefer Ben Davis, Winesap, and Missouri Pippin, and would add for family orchard Early Harvest, Duchess of Oldenburg, and Maiden's Blush. I prefer a rich bottom having a red subsoil, and a northeast slope. I prefer thrifty, two-year-old, medium-height trees, set thirty feet each way. I cultivate my orchard as long as it lives with a shovel plow and cultivator, and keep the ground stirred. Plant potatoes in a young orchard, and cease cropping when the trees

begin to bear; then sow oats and let the pigs eat it off while it is green. Wind-breaks are not essential here, but some have forest-trees planted on the north side of their orchards. I prune my trees in the spring to give shape; cannot say whether it is beneficial or not. I fertilize my orchard with barn-yard litter. I pasture my orchard with pigs until the ripe fruit begins to fall; I think it advisable and that it pays, as the pigs eat all the wormy and worthless fruit that falls. My trees are troubled with tent-caterpillar, root aphid, round- and flat-headed borers, and woolly aphid, and my apples with codling-moth.

A. J. KLEINHANS, Grantville, Jefferson county: I have lived in the state forty-one years. Have an apple orchard of 300 trees, twenty to twenty-five years old. For market I prefer Winesap and Ben Davis; and for family orchard Summer Astrachan, Bellflower, and White Winter Pearmain. Have tried and discarded Missouri Pippin, Russet, Baldwin, Red Astrachan, Little Romanite, and Pound Pippin. My orchard is situated in the Kaw valley. I plant my orchard to corn, until the trees get too large; then cease cropping and seed to clover and timothy. I prune lightly, to keep the limbs off the ground and let in the sun and light; I think it pays. I do not thin the fruit while on the trees. I pasture my orchard late in the fall with young dehorned cattle; I think it advisable and that it pays. My trees are troubled with canker-worms; and my apples with codling-moths. I do not spray. I sell apples in the orchard at wholesale.

J. W. ATKINSON, Perry, Jefferson county: I have resided in Kansas seventeen years; have an apple orchard of 2100 trees from two to eighteen years old. For market I prefer Winesap, Missouri Pippin, and Jonathan. I have tried and discarded Ben Davis; the tree is not hardy. I prefer a porous, red-clay subsoil, and a northeast or east aspect. I cultivate my orchard to corn six years from setting, and cease cropping after twelve years. I seed the bearing orchard to clover. Windbreaks are essential on the south and west sides of the orchard; when possible, natural forest is best. I prune my trees sparingly to improve the grade of fruit; I think it pays when properly done. I do not thin the fruit on the trees. Can see no difference whether trees are in block [of one kind] or mixed plantings. I fertilize my orchard when it needs it with barn-yard litter and wood ashes; would not advise it on all soils. I do not pasture my orchard. My trees are troubled with root aphid, and my apples with codling-moth and curculio. I spray twice after the blossom falls, with Paris green. I can get rid of borers only by persistent effort. I sort my apples into four classes: No. 1, No. 2, drying, and stock and cider. Pack in twelve-peck barrels, and market in apple racks. I sometimes wholesale my apples in the orchard. Never tried distant markets. I do not dry any.

Am successful in storing in barrels in a fruit house which is built near the crest of a hill with a fall of 14 in 100 feet. Excavated twenty-three by fifty-three feet; depth at extreme back end, fourteen feet; at front seven feet. Trench fourteen inches deeper than the excavation next to bank, filled with broken rock. Stone wall ten feet high; fine broken rock between wall and bank from ditch to top of wall around the entire building. The front end of the building stands three feet out of the ground, allowing two windows in the front with refrigerator shutters, also a refrigerator door. Heavy timbers, supported by posts covered with bridge lumber, constitute the framework, upon which is seven feet of earth. Through the roof are five sewer-pipe ventilators covered by thimble tops. In the front end are four small ventilators. In the extreme back end is placed an elevator building forming an opening six feet square; this ex-

tends eight feet above the top of the earth covering. There are three windows and one door in the elevator building. By means of small ventilators the house can be ventilated very gradually, but by the elevator opening in the back end of the building, and the windows and door in the front end, the air can all be swept out by natural draft and replaced by fresh air. Five minutes is sufficient to thoroughly ventilate. During all this extreme wet weather the floor of the building has been dust dry.

DR. CHAS. WILLIAMSON, Washington, Washington county: I have lived in Kansas forty years. My first planted orchard is thirty-eight years old and the second thirty years. For market I prefer Ben Davis, Winesap, Missouri Pippin, and Rawle's Janet; and for family use Ben Davis, Winesap, Jonathan, Rome Beauty, Rambo, Early June, and Romanite. I have tried and discarded Cooper's Early White, because it is a short-lived tree and a shy bearer. I prefer bottom land with a black loam and a clay subsoil, with a north and east slope. I plant trees thirty feet apart. I would advise cultivation for three years; seed bearing orchard to white clover. Windbreaks are essential; would make them of mulberries and cedar; plant seed for mulberries and set small cedars. For rabbits I use traps and dogs. I prune, but not very much; I cut out watersprouts and dead limbs, and thin out the top so as to let sun in. I never have thinned the fruit on the trees, but think it would pay. I keep bees to help pollinize the blossoms. I fertilize my orchard with stable litter; trees and plant life, as well as stock, need food. I do not pasture my orchard; it is not advisable. I have sprayed with London purple. I protect my trees from the sun, and the bark being full of sap the borers will not trouble them. I hand-pick my apples and pack in barrels in the orchard. I sell in the orchard at retail. My best market is at home. Do not dry any. I store some apples, and find Ben Davis, Winesap and Missouri Pippin keep best. When packing apples for storing I wrap each apple in paper and put a paper between the layers in the boxes; then put them in the cellar, and they keep well. I open the cellar door on warm days. Prices have been from 35 cents to \$1.10 per bushel.

There is not a state in the union but what is profiting by the experiences of such men as friend Wellhouse, the "Apple King," and other horticulturists, who are leaving a legacy to future generations. My experience in orcharding has been as an amateur ever since 1856. My orchard has been for home use, but now, with my experience gained here in Kansas, I am planting in the Ozark country, near Olden, exclusively for market purposes (the same can be done in Kansas), but takes longer to come to maturity. Taxes are low in Missouri. The orchardist should not be assessed on his fruit-trees and pay the penalty for being energetic and a pusher in horticulture. In Kansas, thanks to the life work of the members of the State Horticultural Society, we have reached a point where the culture of fruit is an assured success; and there is more money in it than in hog or corn raising. The trouble has been, too many worthless varieties have been planted, and now that they are bearing are profitless; and the worst of it is they are repeating the same mistake each year. I have saved some valuable trees from the borers by taking a quarter-inch bit and boring a hole and putting in strychnine or sulphur, and the tree lived on while all others died; even in the black locust it was successful. I then plug the outside portion of the hole. Let some one explain the reason who understands the circulation of the sap.

ERNST FAIRCHILD, Hiawatha, Brown county: I have lived in Kansas thirty years; have an apple orchard of fifteen acres, twelve years old. For market I

prefer Jonathan, Ben Davis, and Rawle's Janet; and for a family orchard Snow, Winesap, and some sweet varieties. I prefer an east slope. I cultivate my orchard to corn or oats for eight or nine years, using a disc and harrow, and cease cropping at the end of this time and seed down to clover. Windbreaks are essential; would make them of forest-trees set in rows, on the north and west sides. I prune my trees to give shape. I pick my apples in square tin pails which have false bottoms; slide the fruit out at the bottom. I make vinegar of the cull apples. Prices have been from sixty cents to one dollar per barrel. I employ men and boys—men at one dollar per day and boys seventy-five cents per day.

NEILS HANSON, Willis, Brown county: I have resided in the state thirty-two years; have an orchard of 200 apple trees twenty years old. For all purposes, I prefer Ben Davis, Jonathan, Willow Twig, and Strawberry. Have tried and would discard Willow Twig and Lawver. I prefer bottom land having a clay soil and a north or east slope. When planting trees, I dig a hole two feet deep and four feet square. I cultivate my orchard eight or ten years, using a plow, and spade around the trees. I plant corn or oats in a young orchard. Windbreaks are essential; would make them of maples or willows and cultivate the same as a crop. I prune to thin the tops, and think it beneficial. I thin the fruit when small, if the trees are overloaded. Can see no difference whether the trees are planted in blocks of one kind, or mixed up. I fertilize my orchard, but not close to the trees; would not advise it on bottom land. I pasture my orchard with calves and hogs, but it is not advisable; it does not pay.

I do not spray. I am experimenting with my trees; I make a hole two inches deep, one-fourth inch in diameter, put in medicine and plug up tight with grafting wax over it. It is claimed to kill all the insects on the tree for four or five years to come. I can tell the results this fall. It costs \$10 to try it. [Hear! hear!] My neighbors spray their trees when in blossom, and say it pays. I pick my apples by hand, sort into two classes, and pack in barrels, filled full, and marked with consignee's name and hauled to shipping place on wagon. I never sell apples in the orchard, because they [the pickers] ruin the trees. I wholesale my best, second and third grade apples to the one offering the most for them. I feed the culls to hogs. Hiawatha is my best market. I never tried distant markets; it would not pay, unless in car-load lots. I dry apples, put them in sacks and hang in a dry place, and find a ready market for them; it pays. Am successful in storing apples in boxes—made of lath an inch apart—in an arched cave. I find Ben Davis and Rawle's Janet keep best. I have to repack stored apples before marketing, losing about one-tenth of them. I do not irrigate. Prices have been about one dollar per barrel. I pay eighteen to twenty dollars per month and board for help.

ISAAC M. TAYLOR, Richmond, Franklin county: I have lived in Kansas thirty years; have about fifty apple trees eight years old, ten feet high. For market I prefer Jonathan and Ben Davis; for a family orchard, Romanstem, Gilpin, Rawle's Janet, Winesap, and Hubbardston's Nonesuch. Have tried and discarded McAfee Nonesuch, Belleflower, and Missouri Pippin. I prefer a gentle east slope at the bottom of a hill, with a deep sandy loam or four feet of red land on lime rock. I prefer two-year-old trees set thirty by thirty feet apart, in holes dug eighteen inches deep, and filled one-third full of surface soil. I cultivate my orchard as long as it lasts with a twelve-inch plow; throw the dirt away first of June, and back in August; then harrow it. I plant potatoes and corn in a young orchard, and cease cropping after ten years. I plant nothing in a bear-

ing orchard. Windbreaks are essential; would make them of-rows of Osage orange on the north and south sides of the orchard. I prune as little as possible. I fertilize my orchard with cow-stable and horse-stable litter mixed; I think it beneficial, and would advise it on all soils, unless very rich. I pasture my orchard once in a while with hogs without rings in their noses, so they can hunt worms. My trees are troubled with borers. I do not spray. I pick my apples in sack from ladders. Sort into three classes, and peddle them. I use Topping's driers and Williams's parers; they are satisfactory. After drying I pack in fifty-pound boxes. I find a ready market in Kansas City for them, but it does not pay. I am successful in storing apples in small boxes and barrels in a cellar; Gilpin and Ben Davis keep best. I have to repack stored apples before marketing, losing about five per cent. I do not irrigate. Prices were thirty-five to fifty cents in the fall; seventy-five cents to one dollar in the spring [1897].

JOHN GREGG, Willis, Brown county: I have been in Kansas since '68; have an apple orchard of 120 trees about twenty years old. For a commercial orchard I prefer Ben Davis, Winesap, Gano, and Dominic; and would add for a family orchard Red June, Holland Pippin, and Yellow Transparent. I have tried and discarded Willow Twig on account of blight, and Missouri Pippin on account of blight and shy bearing. I prefer high land with a porous clay subsoil, and a north, northeast or northwest aspect. When planting trees I dig deep, wide holes, lean the tree to the southwest, apply water, then fill and tramp well. I cultivate my orchard for five years with an orchard disc; plant corn and potatoes. Seed bearing orchard to clover. Windbreaks are essential; would make them of honey-locust, maple, ash etc., on the south and west sides of the orchard. For rabbits I wrap the trees with corn-stalks. I prune mostly in June, to give the trees shape; I think it pays. I do not thin my fruit, but think it would pay. I do not fertilize my orchard to any extent; think clover is good left on the ground. I do not pasture my orchard; it does not pay. My apples are troubled with codling-moth. I do not spray. I pick my apples by hand into a basket or sack. The shippers do the sorting. I wholesale, retail and peddle my apples; sell the best to shippers, culls to neighbors or make cider of them. My best market is at home; never tried distant markets. Do not dry or store any. Prices have been from seventy-five cents to one dollar per barrel.

WILLIAM CUTTER, Junction City, Geary county: I have lived in Kansas twenty-eight years; have an apple orchard of 4000 trees. For a commercial orchard I prefer the list recommended by the State Horticultural Society. I prefer a rich bottom with a north aspect. I prefer two-year-old trees four or five feet tall, branched low. I cultivate my orchard as long as it lives with a disc harrow or plow. The first five years I plant a crop that requires cultivation, and plant nothing in a bearing orchard. Windbreaks are very beneficial; would make them of two rows of Russian mulberries set ten feet apart in a row. I prune very little when young to balance the tree; I think it pays. I do not thin my fruit while on the trees, but think it would pay if I had time. I fertilize my old orchard with stable litter, and think it advisable on all soils. If you do not do this you must prune. I do not pasture my orchards. My trees are troubled with canker worm, root aphid, flathead borer, roundhead borer, woolly aphid, and leaf-roller, and my apples with codling-moth, curculio, and gouger. I spray for canker-worm and codling-moth—the oftener the better. I think I have reduced the codling-moth. I dig the borers out, and kill the rabbits. I carefully pick my apples by hand from a step-ladder, into half-bushel baskets, and

sort into three classes—first, second, and culls. Pack in barrels rounded up and marked on the head; then send to market by rail. I sell some apples in the orchard, usually at wholesale. My best markets are south—Texas. I do not dry any. I am successful in storing in boxes, barrels and bulk for home market; I find Fink keeps best. Never tried artificial cold storage. I have to repack stored apples before marketing, losing about one-fourth of them. I do not irrigate. Prices have been from fifty cents to one dollar per bushel. I pay my help one dollar per day and board.

A. H. GRIESA, Lawrence, Douglas county: I have lived in the state thirty-one years. Have an apple orchard of 1000 trees, from six to eighteen years old. For a commercial orchard I prefer Missouri Pippin, Ben Davis, and Winesap; and for a family orchard Yellow Transparent, Early Melon, Jonathan, and Gano. I have tried and discarded Gilpin, Lawver, and McAfee; they were not productive or good. I prefer a sandy river bottom. I prefer one-year-old trees, set as they grew in the nursery. I cultivate my orchard to small fruits, using a disc or cultivator; cease cropping when the trees spread too much. The more cultivation the better. Windbreaks are not essential. I trap the rabbits; and dig the borers out in May and September. I prune my trees a little each year, to let in sunshine; I think it pays and is beneficial. I thin the fruit while on the trees a very little; but it would pay to while the fruit is small. My trees are in mixed plantings. I fertilize my orchard with barn-yard litter and ashes; and would advise their use on all soils. I do not pasture my orchard; but think it would pay, with calves and young pigs. My trees are troubled with borers and aphids, and my apples with codling-moth. I do not spray. I pick by hand, and sort into three classes; pack in three-bushel barrels, facing the bottoms, and ship to market by freight or express. I sell apples in the orchard; sell the second and third grades to evaporators. I have tried distant markets, and found it paid. I do not dry any. I am fairly successful in storing apples in boxes and barrels, in a barn cellar, for market and family use, and find the Fink and Cullins keep best. Never tried artificial cold storage. I have to repack stored apples before marketing; the per cent. lost depends on the variety. I do not irrigate. Prices have been from seventy-five cents to two dollars per barrel. I pay my help one dollar per day.

WILLIAM BOND, Rossville, Shawnee county: I have lived in Kansas twenty-one years; have an apple orchard of about 300 trees, from five to twenty-five years old. For market I prefer Ben Davis, Missouri Pippin, and Winesap; and for a family orchard would add Chenango Strawberry and Maiden's Blush. I have tried and discarded Rawle's Janet on account of rot, worms, and shy bearing, and Smith's Cider on account of blight. I prefer bottom land having a deep, porous subsoil and an east or south slope. I prefer two-year old trees, set in rows thirty feet apart each way. I cultivate my orchard with corn or potatoes for six or eight years, using a common cultivator, and cease cropping at the end of this time; plant the bearing orchard to clover. Windbreaks would be beneficial; would make them of forest-trees or Osage orange, by planting in three close rows on the south and west sides of the orchard. For rabbits I tie split corn-stalks around the trees. I prune very little; just enough to keep the head open and the watersprouts off. I do not thin the fruit while on the trees. My trees are planted with one variety in a row. I do not fertilize my orchard. I do not pasture my orchard; it is not advisable. My trees are troubled with canker-worms

and flathead borers, and my apples with codling-moth. I do not spray. I pick my apples by hand. I sell apples in the orchard; also wholesale, retail and peddle some. The home market is best; never tried distant markets. I do not dry or store any. I do not irrigate. Apples were fifty cents per bushel in the fall of 1897. I paid my help one dollar per day.

REUBEN WALTON, Aurora, Cloud county: I have lived in Kansas twenty years. Have an apple orchard of 200 trees from six to eighteen years old. For a commercial orchard I prefer Ben Davis, Late Emperor, and Maiden's Blush; and for a family orchard Winesap, Cooper's Early White, Late Emperor, Maiden's Blush, and Rhode Island Greening. I prefer a north slope with a rich black loam and limestone subsoil. I prefer two-year-old, well-rooted trees, set twenty feet apart. I cultivate my orchard to potatoes for ten years, using a double shovel plow, and cease cropping at the end of this time, planting the bearing orchard to grass. Windbreaks are essential; would make them of evergreens. I dig borers out. I prune to give the trees more air and better shape; I think it pays. I do not thin the fruit while on the trees; the hail and dry weather generally do that for me. My trees are in mixed plantings. I have one apricot tree which never bore until a swarm of bees came and lit on it, and it has borne every year since then [??]. I do not fertilize my orchard; our soil does not need it. I pasture my orchard all the time, with hogs and pigs. It is not advisable, as they injure the trees, but they pick up the wormy fruit. My trees are troubled with canker-worms, and my apples with codling-moth. I spray with London purple and Paris green three times, when we have the time and water to spare. Think I have reduced the codling-moth. I pick my fruit by hand and sell some apples to the neighbors in the orchard. I feed culls to pigs. I never tried distant markets. I have apples dried on shares for family use. It does not pay to dry for market. I am partially successful in storing apples in barrels in a cellar under the house. I find Rhode Island Greening, Ben Davis, Duchess of Oldenburg and Emperor keep best. I have to repack stored apples before marketing, losing one-fourth of them. I do not irrigate. Prices have been from twenty to thirty cents per bushel.

W. D. CELLAR, Edwardsville, Wyandotte county: Been in Kansas twelve years; have 2000 apple trees from two to eight years of age, comprising Ben Davis, Jonathan, Gano and Missouri Pippin for commercial purposes, and Maiden's Blush, Early Harvest, Bailey Sweet, Huntsman's Favorite, Grimes' Golden Pippin and Winesap for family orchard. I have discarded the McAfee and Lawver as unproductive. I prefer loose soil, and hill land with an east and north slope. Plant thrifty two-year-old trees, in rows 25x30 feet. I cultivate to corn, berries, etc., until seven or eight years old, with the Planet jr. horse hoe, and then sow to clover. Windbreaks are not needed in our locality. I prune conservatively, cutting out broken or interlacing branches, and suckers at the base; I believe it pays. Have never thinned on the tree, and fertilize with barnyard litter and clover. I do not pasture my apple orchard. Am troubled some with insects, but have not sprayed. I dig out borers, which I think may be largely prevented by the use of wooden tree wrappers. I pick in the ordinary way and divide into two classes: select, sound, smooth apples above two inches in diameter; number two, sound apples too small for select. I do this on a sorting table, and pack in twelve-peck barrels, pressed down, and marked with a stencil. I sell at wholesale, sometimes in the orchard; culls I sell in the orchard or the Kansas City market. Our best market is Kansas City. I have shipped to distant markets and made it pay. Have never dried any. Have stored for

winter in barrels in cold store; they have not kept satisfactorily, I cannot say why; Jonathan and Missouri Pippin kept best this past winter. I had to repack this spring and lost twenty per cent. Prices have ranged from 10 cents to \$1.50 per bushel. For help I use men, and pay one dollar per day.

C. D. GAISER, Lansing, Leavenworth county: Have lived in Kansas forty years. Have 5000 trees eight years old, of Gano, Ben Davis, Jonathan, and Huntsman's Favorite; I grow no others. My location is hilltop, with good, rich soil, and a clay subsoil; slope makes no difference. I plant two- and three-year-old trees, 15x30 feet, and cultivate to corn for seven or eight years, and then sow to clover and timothy. I never prune, thin, or fertilize; and allow no stock in the orchard. I do not spray, but dig the flat-headed borer out with a knife. I use ladders, and gather in baskets and pour into a wagon, and sort in unloading; I make only two classes, culls and good apples. I ship my best apples to different points in barrels, and it pays; my culls I make into cider. Have never tried drying apples. I store some for winter in bulk, and keep them successfully. I use men and boys for help. I sell for \$1.25 to \$1.50 per barrel.

W. H. ROBINSON, Dunlap, Morris county: Has lived in Kansas thirty years; has 1000 apple trees, planted from two to nineteen years. Prefers Ben Davis, Winesap, Missouri Pippin, Grimes's Golden Pippin and Jonathan for commercial purposes, and Early Harvest, Grimes's Golden Pippin, Duchess of Oldenburg and Cooper's Early White for family use. Has turned down Rawle's Janet, as they rot on the trees. All on best bottom land, clay subsoil. Plants two-year-old trees thirty-five feet apart each way, with nothing [?] between. Plants to corn, and cultivates well up to twelve years. Is protected on the southwest by a belt of timber. Keeps rabbits off by wrapping with corn-stalks. Prunes to make the tree healthier and apples finer; says it pays. Plants varieties in alternate rows, but does not say why. Uses all the stable litter he can get. Pastures with cows after gathering; says they eat the culls and wormy fruit, and it pays. He advises others to try it. Sprays with London purple before blooming, after blooming, and ten days later for tent-caterpillar and codling-moth, and believes he has reduced both of them. Has no borers—thinks "a stitch in time saves nine." Picks and sorts into two classes, first and second. Always sells in the orchard to western apple haulers. Lets the cows have all culls he does not use for cider. Price in orchard for picked apples, forty to fifty cents per bushel.

J. H. TAYLOR, Rhinehart, Dickinson county: Lived in Kansas twenty-two years. Have 700 apple trees, out from one to nineteen years. Prefer, for commercial purposes, Ben Davis, Winesap, Missouri Pippin, and Rawle's Janet; and for family orchard add Early Harvest, Red Astrachan, and Rambo. Have discarded all the specially recommended eastern [?] varieties as shy bearers, and too warm for Grimes's Golden Pippin. Prefers to plant on good black loam, in ravines facing north. Plants two-year-old thrifty trees, some 33x33, others 33x16½ feet. Have tried to grow root grafts, with poor success. Cultivate all the time with disc and plow; grow corn for five or six years, afterward nothing. Does not need windbreak, but would use if required—about fifteen rows of ash and catalpa, planted four by four feet. Wraps trees from rabbits. Mice ate bark off and completely girdled roots six inches in diameter under the ground last winter (1897-'98). Prunes some to keep the top balanced and low, to prevent sun-scald and effects of wind. Uses fresh stable litter as a mulch, and believes it pays. Does not pasture at any time. Has few insects, and does not spray much, says rains

wash it off too readily. Picks in baskets, and finds the family the best market; stores for winter in boxes and barrels, and is successful with Rawle's Janet, Winesap, and Missouri Pippin. Prices have run from fifty cents to one dollar per bushel. Uses farm help at fifteen to eighteen dollars and board per month:

JAMES LAWRY, Hollis, Cloud county: I have lived in the state sixteen years; have an apple orchard of 140 trees from six to fourteen years old. For all uses I prefer Ben Davis, Winesap, and Missouri Pippin. I have discarded the Willow Twig because they die out. I prefer a clay soil. I prefer three-year-old trees set in big holes. I cultivate my orchard about five years with a one-horse shovel plow. I plant potatoes or sweet corn in a bearing orchard, and cease cropping when the trees cover the ground, and sow red clover in a bearing orchard. Windbreaks are essential; would make them of mulberries. I prune with a saw, to make them more productive; I think it pays. I never thin my fruit while on the trees. Can see no difference whether trees are in block of one kind or mixed plantings. I do not fertilize my orchard, or spray. I pick my apples by hand from a ladder. I do not sell in the orchard. I do not pasture my orchard. Do n't dry any.

LEVI KIMMAL, Concordia, Cloud county: I have lived in Kansas twenty-five years; have an apple orchard of 120 trees eighteen years old. For market I prefer Ben Davis, Missouri Pippin, and Winesap; and for a family orchard Missouri Pippin, Winesap, Limber Twig, and Maiden's Blush. I have tried and discarded Golden Russet on account of shy bearing. I prefer a sandy loam with a clay subsoil, having a north or northwest aspect. I prefer two-year-old trees for planting. I plant my orchard up to bearing with potatoes and corn; then seed down to red clover. Windbreaks are essential; would make them of several rows of Osage orange on the south side of the orchard. I prune my trees; thin out the top to let the sun in for coloring. My trees are more fruitful when planted in blocks. I fertilize my orchard with stable litter; I think it beneficial because it mulches, enriches, and holds the moisture, and would advise its use on all soils; no land is so good but what stable litter will make it better. I do not pasture my orchard; I do not think it advisable; but I mow all the weeds or whatever grows in the orchard and leave it on the ground for a mulching. My trees are troubled with twig-borers and leaf-rollers, and my apples with codling-moth. I have sprayed my trees when in blossom with Paris green; did not succeed last year. I dig borers out and pick the bad fruit (if there is any) off. I hand-pick my apples for winter use into baskets from step-ladders. I sell apples in the orchard; would rather sell that way than to hold them. I feed the culls to pigs. My best market is at home; I never tried a distant market. I do not dry any. I am successful in storing apples for home use in a cellar. I do not irrigate, but use stable litter for moisture. Winter apples brought fifty cents per bushel; dried apples three or four cents per pound.

SENECA HEATH, Muscotah, Atchison county: I have lived in the state thirty-one years; have an apple orchard of 2080 trees from three to thirty-six years old. For market I prefer Ben Davis, Missouri Pippin, York Imperial, Jonathan, Grimes's Golden Pippin, Stark, and on rich, moist soil, Winesap; and for a family orchard Early Margaret, Early June, Early Harvest, Cooper's Early White, Sweet Bough, Keswick Codlin, Maiden's Blush, Red Astrachan, Autumn and Summer Pearmain, Rambo, Fulton, Smith's Cider, and Newtown Pippin (if given extra care). Have tried and discarded Tompkins County King—the borers kill

it on all soils—and Willow Twig on account of blight. I prefer upland with a black sandy or gravelly loam and a good limestone soil, with a porous subsoil as a necessity, and a northeast slope. I prefer thrifty one-year-old trees, set in plowed furrows and covered with a spade; "hill up" rather than "dig down." I cultivate my orchard to corn or any cultivated crop for eight years, using a plow and harrow, and cease cropping at the end of this time, and plant nothing in a bearing orchard; it does not pay. Windbreaks are essential, especially on upland. I would make them of red cedar, soft maple, or Osage orange, by planting in rows and cultivating four to six years. For rabbits I use tarred paper, and wood ashes for borers. I prune my trees with a saw and shears to produce fruit and shape; I think it pays, but the Ben Davis and Jonathan grow into handsomer shapes if left alone. If a tree is growing too rapidly to set fruit, prune in June. I thin the fruit while on the trees by picking off the wormy and defective ones. I keep this up until nearly grown; it pays. My trees are in mixed plantings, and believe they are more fruitful.

I fertilize my orchard with barn-yard litter, ashes, salt, and lime, and would advise it on all excepting rich soils, where it ought not to be used until after the trees have fruited five to eight years. Probably the cheapest and best fertilizer on upland is clover mowed and left to decay where it fell. Weeds are also good if mowed when two feet high and left on the ground. I pasture my orchard with pigs, calves, and horses, but it does not pay. My trees are troubled with tent-caterpillars and round-headed borers, and my apples with codling-moth. I spray with a two-horse wagon sprayer, also a hand sprayer, when the blossom falls, with Paris green, and think I have reduced the codling-moth. I burn tent-caterpillars with a coal-oil lamp or torch. I pick my apples by hand into half-bushel baskets, from ladders. I sell my apples in the orchard. I sell, feed to the stock, and make cider of the culls. I do not dry any, but think it would pay. I have stored apples in barrels, and found the Winesap, Rawle's Janet, Ben Davis, Missouri Pippin, Stark and Baldwin keep best. I am not always successful; will not store any more until I build a fruit house. I do not irrigate, but intend to. Prices have been from 75 cents to \$1.75 per barrel. I employ men and boys, and pay two cents per bushel for picking.

ED. SANDY, Linn, Washington county: I have lived in Kansas twenty-eight years. Have an apple orchard of 100 trees, fifteen years old. I prefer a north slope. I plant my orchard to corn, using a cultivator; and continue cultivating bearing orchard. I prune my trees. Do not thin the fruit while on the trees. I fertilize my orchard with barn-yard litter, and think it beneficial; I would advise its use only on upland. I do not pasture my orchard. My apples are troubled with codling-moth and curculio. I have sprayed with Paris green for worms, and am not very successful.

J. A. COURTER, Barnes, Washington county: Have lived in Kansas since 1869; have an apple orchard of 150 trees, set from nine to twenty-five years. I prefer bottom land with a northeast slope. I cultivate my orchard to corn all the time. Windbreaks are not essential. I fertilize my orchard with stable litter; my trees grew fine, but for the last three or four years they have blighted badly. I do not spray. I store some apples for winter use in boxes in a cave.

THOMAS BROWN, Palmer, Washington county: I have resided in the state twenty-eight years. Have an apple orchard of 500 trees from three to twenty years old. For a commercial orchard I prefer Winesap, Missouri Pippin, and

Ben Davis, and for family orchard Cooper's Early White, Maiden's Blush, and Jonathan. I prefer sandy land on an east slope. I plant trees in rows sixteen by twenty-one feet. I mulch my orchard with straw, and plow every three or four years. Windbreaks are essential; I would make them of maple or box-elders, planted around the orchard. I prune some, but it does not pay. I do not thin the fruit while on the trees. I fertilize my orchard with stable litter; I think it beneficial, and would advise its use on all soils. I pasture my orchard some with swine, but it is not advisable; it does not pay. My trees are troubled with fall web-worms. I do not spray. I pick my apples by hand. I sometimes sell the apples in the orchard at retail. My best market is at home; I never tried distant markets. I do not dry any. Am successful in storing apples in boxes and barrels in a cellar. Winesap and Missouri Pippin keep best. I never tried cold storage. I have to repack stored apples before marketing, losing about one-third of them. I do not irrigate. Prices have been about fifty cents per bushel.

D. J. FRASER, Peabody, Marion county: I have lived in Kansas twenty-three years; have 380 apple trees ten inches in diameter, twenty-two years planted. I prefer for commercial purposes Ben Davis, Missouri Pippin, Grimes's Golden Pippin, and Maiden's Blush; and for family use would add Early Harvest, Sweet June, and Winesap; have tried and discarded about thirty other varieties, because they did not yield or were subject to disease. I prefer bottom land, with north slope, made land. I plow out deep, dead furrow; set trees and plow the earth back to the trees. I prefer two- or three-year-old strong trees. Have tried root grafts and seedlings with good success. I cultivate the trees the first ten years with the plow and harrow. I grow nothing in a young orchard, and seed the old orchard to clover. I think windbreaks are essential on the south, and would make them of Osage orange or mulberry, planted in double rows, a few feet apart. Wrap trees for rabbits, and for borers keep trees thrifty. I prune some to keep the top balanced, and think it beneficial. I have thinned fruit some, but do not think it pays. My trees are in mixed plantings, and I keep bees. I have used fertilizer, but could not see much benefit; would advise it only on thin soils. I have pastured my orchard with hogs, and think it advisable; it pays. My trees are bothered with canker-worm, root aphid, flathead borer, and twig-borer; the codling-moth troubles my apples. I have sprayed with Bordeaux mixture, London purple, and Paris green; could not see much good; have reduced the codling-moth some. I pick my apples the old-fashioned way—with a sack. Practically, the crop has been so light that very few have been sold, and they were fall apples. Have never dried any; have never stored any. Do not irrigate. Prices have been unsatisfactory.

J. B. MOSHER, Lawrenceburg, Cloud county: I have lived in Kansas seventeen years. Have an orchard of 150 trees, planted from one to seventeen years. For family orchard would plant Early Harvest, Cooper's Early, Duchess of Oldenburg, Grimes's Golden Pippin, Winesap, Rawle's Janet, and Ben Davis. Medium elevation, with northern or northeastern slope, and clay-loam soil with clay subsoil, is preferable. When planting, I dig a hole large enough to receive the roots, and plant healthy two-year-old trees, trained to a switch, so that I can train the top to suit. Have tried root grafts and seedlings; both have done well. I cultivate while the trees are young, and use only harrow and mowing-machine after they begin to bear. I plant any hoed crop among the trees while young, and cease when the trees begin to bear. I think windbreaks essential, and use maple, box-elder, and Scotch pine. For rabbits I use traps and shot-gun. I use

a knife for the borers. I prune when the tree needs it; use the saw on large trees and the knife on small trees. I thin the fruit sometimes when it sets too thickly, as soon as it shows, and it pays most emphatically. I cannot see any difference in trees whether set in blocks or mixed up. I use some barn-yard fertilizer, and think it beneficial; would advise its use as the trees begin to bear. I pasture my orchard with pigs and poultry; think it advisable, and think it pays.

My trees are troubled with bud moth, flathead borer, and twig-borer; some seasons I also have leaf-roller and leaf-crumpler. The codling-moth troubles my apples. I spray some to destroy these insects, with indigo and London purple, using a pump. I do not know that I have reduced the codling-moth any. For borer I form a basin around the tree and fill with water, repeating several times; I sometimes pick them. I use an ordinary fruit ladder, and sack with ends tied together and swung over the shoulder. I make but one class, viz., market all the perfect apples. I carefully put in a fruit-house and let stay a week or so, then carefully sort over by removing all unsound or faulty ones. I do not ship. I have a good market at home. I never sell in the orchard; usually market in bushel boxes. I usually feed second- or third-class fruit to hogs. My best market is Concordia. Have never tried distant markets. I have never dried any apples. I store some for winter use in an ordinary cellar; am successful, and find Winesap, Rawle's Janet and Missouri Pippin keep the best. We have to repack after storing, and lose about one-third. I do not irrigate. Winesap, Missouri Pippin and Rawle's Janet usually sell at one dollar per bushel; Ben Davis, at seventy-five cents per bushel.

C. C. GARDINER, Bradford, Wabaunsee county: Have lived in Kansas thirty-nine years, in this county fourteen years; have 750 apple trees ten years planted. For commercial orchard I would plant Ben Davis, Winesap and Missouri Pippin; for family use, add Jonathan and Maiden's Blush. Have tried and discarded Keswick Codlin; tree is tender. I prefer hilltop, north and west or northeast slope, black loam with a yellowish clay subsoil. I plant thirty feet apart, using one- and two-year-old, low-headed trees. Have tried root grafts; had good success. I cultivate until the trees are six or seven years old with the plow and cultivator. I grow corn in a young orchard, and clover in a bearing orchard; cease cropping when six or seven years old. Windbreaks are beneficial on the south and west; they should be made of quick-growing trees. I wrap the trees with paper to protect against rabbits. I prune but little to thin top; am doubtful if it pays. Never thin apples on trees. I fertilize the land with well-rotted manure, but not close the trees; I would advise its use on all soils; I think it beneficial. I sometimes pasture my orchard with hogs; do not think it advisable; pays only in getting rid of wormy fruit. My trees are troubled with leaf-roller, and my apples with codling-moth. Do not spray. Gather my apples by hand, and sort into two classes, first, second and culls.

ISAAC E. WOLF, Longford, Clay county: Have been in Kansas twenty-one years; have 200 apple trees nineteen years old, and 100 apple trees six years old. Prefer Ben Davis, Winesap and Missouri Pippin for market, and Maiden's Blush, Duchess of Oldenburg and Smith Cider for family orchard. The Red Astrachan and Early Harvest are shy bearers. My orchard is on sandy soil with clay subsoil; the trees look healthy. I prefer two-year-old trees, and lay the ground off in squares, making large holes. In young orchard I plant corn for ten years, cultivating both ways; after that I grow nothing, but cultivate with the disc as

long as I can get through it. Am cultivating my old orchard. I think wind-breaks are a necessity on the south, west, and north, and would make them of walnut and box-elder. For rabbits I rub on strong grease. I prune with shears such limbs as rub one another, and am sure it pays. I don't think it pays to thin fruit on the trees. I believe in fertilizing the ground, but not too close to the trees; it won't hurt any soil. Allow no stock in the orchard. The twig-borer is the worst insect in my orchard. I tried spraying on some trees, and some I did not, and my apples were all alike. I watch for borers closely, and cut them out. I pick in a grain sack, and make three classes. The best I keep for spring, the second class for winter, and the culls I turn into cider. I peddle my apples out at home. We dry some apples and have a good market at home. We store for winter in the cellar in bulk, and find that Winesap, Rawle's Janet and Missouri Pippin are the best keepers.

FRUIT DISTRICT No. 2.

Following is the second fruit district, comprising twenty-three counties, in the northwest quarter of state. Reports, or rather experiences, from each of these counties will be found immediately following. We give first the number of apple trees in this district, compiled from statistics for 1897. Many thousands were added in the spring of 1898.

	<i>Bearing.</i>	<i>Not bearing.</i>	<i>Total.</i>
Cheyenne	211	1,708	1,919
Decatur	3,925	4,990	8,915
Ellis	3,846	1,321	5,167
Ellsworth	17,491	12,474	29,965
Gove	214	1,202	1,416
Graham	508	3,636	4,144
Jewell	120,509	56,550	177,059
Lincoln	19,619	18,846	38,465
Logan	468	1,465	1,933
Mitchell	55,806	20,624	76,430
Morton	264	171	435
Norton	7,220	6,803	14,023
Osborne	21,647	15,043	36,690
Phillips	16,765	9,486	26,251
Rawlins	806	2,065	2,871
Rooks	8,127	6,815	14,942
Russell	6,788	5,045	11,833
Sheridan	218	1,148	1,366
Sherman	169	1,477	1,646
Smith	41,919	22,988	64,907
Thomas	509	470	979
Trego	745	1,409	2,154
Wallace	223	1,343	1,566
Total in district	327,997	197,079	525,076
Estimate in acreage	60,000	35,000	105,000

WILLIAM BAIRD, Vesper, Lincoln county: I have lived in Kansas twenty-seven years; have an apple orchard of 300 trees, from one to fifteen years old; the old ones measuring twelve inches in diameter. For commercial purposes I prefer Ben Davis, Missouri Pippin, Winesap, and Huntsman's Favorite; and for family orchard Maiden's Blush, Ben Davis, and Missouri Pippin. Think I shall discard Red Astrachan and Red Betigheimer on account of shy bearing. I prefer bottom, sandy soil, clay subsoil, and a northwest slope. I prefer good, stocky, low-headed, yearling trees set from twenty-five to thirty feet in the row; have tried root grafts; that is the only successful way to grow trees here. I cultivate my orchard to potatoes for the first two or three years, after that to any kind of vines. I use a stirring plow, plowing very shallow near the trees and deeper near the center. I grow nothing in a bearing orchard, and cease cropping after five years. I think windbreaks are essential, and would make them of seedling peach, Russian mulberry or any quick-growing trees, in three or four rows on the south side of the orchard. I trap the rabbits, and use my knife on the borers; am not troubled with them very much. I prune trees while young to give the proper shape to the top, and later to remove the crossed limbs and cause them to spread out and shade the

trunk and as much space as possible. I have thinned the fruit on trees to a limited extent; it should be done when about the size of quail eggs. Think it makes little difference whether trees are planted in block or mixed up.

I do not fertilize my orchard; the soil is rich enough; water is what it needs. I pasture my orchard with hogs, and think it advisable, as they eat all the wormy fruit and destroy many insects by rooting; I find it pays. My trees are troubled with root aphid; my apples are bothered by codling-moth, gouger, and blue jays. I spray with London purple and lime, about 100 gallons of water to one pound of purple and six pounds of lime. I think Paris green would be better. I spray for canker-worm as soon as I see them, and am of the opinion that one application is enough, but do not think spraying of any use for codling-moth, as the moth itself does not eat anything but the honey from the base of the bloom, and not enough of the poison reaches them to amount to anything. My method of fighting them is, as soon as the moth appears in the spring, to put old fruit cans in the trees filled with sweet water. This attracts the moths and they drown in it. I also burn torches in the orchard at night. Another way is to hang a lantern over a tub of water that has a little coal-oil in it; this will kill a great many insects.

I hand-pick my fruit into sacks slung over the shoulder; I use a step-ladder for those I cannot reach. I sell apples in orchard; also retail; sell best ones to best customers; I dry second and third grades; of culls I make cider and vinegar and feed to pigs. My best market is at home. I dry some apples; use a Victor evaporator, and one that I made; after drying we heat in an oven, and put in double paper bags, and find a ready market; but it does not pay. I store apples in five-bushel boxes, in a tunnel-like cellar, dug in solid sand-rock; it is fifty feet long, five feet wide, and six and one-half feet deep, with rooms on each side; it is perfectly dry and the temperature even, but it is too warm for winter; I find it is excellent for summer and fall apples. Those that keep best are Rawle's Janet and Missouri Pippin. We have to repack stored apples before marketing; I do not lose many. I use or sell as soon as fit. I irrigate my orchard from a small creek fed by springs. I have two large dams, with ditches running along the hillside, with gates to let the water into the ditches; from the main ditch I have laterals, also provided with gates; the surplus and seepage goes back into the creek below the main dam; the creek below the dam has small dams in it to hold the seepage water at the desired height—which serves for subirrigation, the best irrigation in the world. The water should not stand nearer than five feet of the surface for apples. I run the water between the rows in wide, shallow ditches, any time from March to September. It is not necessary to have a creek to irrigate an orchard. A good, big ditch along the hillside above the orchard will catch enough melted snow and rain to pay for its construction; this should run into a reservoir. Prices have been from seventy-five cents to one dollar, and dried apples from five to twelve and one-half cents per pound.

PETER NOON, Vesper, Lincoln county: I have lived in Kansas thirty years. Have forty apple trees eleven years old, eight to ten inches in diameter, twelve to fifteen feet high. I prefer for all purposes Winesap and Ben Davis. I prefer bottom land with a black soil and sandy subsoil. I plant young trees in rows twenty-five feet each way. I cultivate my orchard for seven years with plow and harrow, raising no crop. Windbreaks are essential; I use cottonwood trees, planted in three rows, around my orchard. I prune with a saw to make the trees bear better and keep them from getting top-heavy; I think it beneficial. I thin my fruit on the trees by hand in July. I never pasture my orchard. My trees

are troubled with bud moth. I do not spray. I pick by hand. Never dry any. Do not store any. Do not irrigate. Prices have been from seventy-five to eighty cents per bushel, and dried apples eight cents per pound.

JACOB WEIDMAN, Lincoln, Lincoln county: Have lived in Kansas twenty-eight years. Have an apple orchard of about 1000 trees, nineteen years old. For commercial purposes I prefer Winesap, Ben Davis, Rawle's Janet, Huntsman's Favorite, Jonathan, Maiden's Blush, Early Harvest, Grimes's Golden Pippin, Duchess of Oldenburg, Autumn Strawberry, Rambo, and Gano. For family orchard would prefer Winesap, Huntsman's Favorite, Gilpin, Milam, Early Harvest, Maiden's Blush, Red June, and Limber Twig, the last one being a very good keeper. Have tried and discarded Red Astrachan, Lawver, Golden Russet, Yellow Bellflower, Willow Twig and Smith's Cider on account of blight. I prefer bottom land with rich soil and loose subsoil, with a northern slope. I prefer two-year-old stocky trees planted in a furrow. I have tried root grafts with the best success; the best trees in this county were grown by me. I cultivate my orchard to corn, using a stirring plow; I cease cropping after six years, but keep cultivating until the trees smother the weeds. Windbreaks are essential. I have native timber on three sides, the south, west, and north; and a hill on the east. For rabbits I wrap the trees with corn-stalks, which also protects them from sun-scald. Am never troubled with borers. I prune moderately to give shape to young trees, and to let the sun and air to the fruit on old trees; many trees are injured by heavy pruning. I never thin.

Mixed plantings of trees are best; my Jonathan do well: all do well that bloom at the same time. I do not fertilize. I never pasture my orchard; would not advise it. My trees are troubled with woolly aphis and root-louse. I have sprayed with London purple; last year I sprayed with Paris green and my apples were free from worms; if London purple is used without lime it burns the leaves; Paris green does not mix well, and has to be stirred all the time. I am going to use carbonate of soda and white arsenic this year; four parts carbonate of soda to two parts of white arsenic, and one gallon of water; boil for fifteen minutes, then add another gallon of water and use two quarts of this to fifty gallons of water. I pick my apples in a sack from a ladder. I sell apples in the orchard; have regular customers for the winter apples. I supply some stores with early and fall apples; never peddle any. I put my second-grade apples in piles of about thirty bushels each, and cover lightly with dirt until cold weather comes. A little freezing will not hurt them. In March or April I market them, and get as much for them as I get for the first-class ones in the fall. Those that keep best are: Ben Davis, Winesap, Rawle's Janet, Gilpin, and Milam. We dry some apples for home use. We put them on frames in a spent hotbed under glass, to keep flies off. I have a large cellar in which I store apples; have never packed them in barrels. I do not irrigate. Prices have been from 35 cents to \$1.50 per bushel. Have help of my own.

L. P. ASHCROFT, Shibboleth, Decatur county: I have lived in Kansas twenty-two years. Have 100 apple trees, eight to twelve years old, four to ten inches in diameter. I prefer for commercial purposes Ben Davis, Winesap, and Willow Twig. I prefer upland with a south slope. I plant two-year-old, low, bushy, stout-top trees. To set, I plow deep and dig deep holes, in the fall. I cultivate my orchard every year from May 1 to July 1, and late in the fall. I use the harrow in the spring, disc and harrow later on, and lister in the fall. I think windbreaks would be beneficial on the south, and would make them of buildings and

sheds of all kinds. I am troubled with small borers in the limbs. I prune out the inside of trees to let sun and air through. I think it beneficial, and that it pays. I never thin apples; the wind does the thinning. My trees are in mixed plantings, and I believe would bear every year if they did not freeze. I fertilize my orchard with stable litter on top of heavy snows. I think it beneficial, if not too close to the trees. I would advise its use on all soils if applied at the right time and in the right manner. I do not pasture my orchard; it does not pay. My trees are troubled with small borers, and my fruit with some insects. I do not spray. I have used coal-oil for borers, but do nothing now. We pick our own fruit.

W. D. STREET, Oberlin, Decatur county: I have resided in the state thirty-seven years. Have an apple orchard of fifty trees seven or eight years old, about six inches in diameter. My orchard is situated on low, bottom land. I prefer two-year-old trees, set in plowed land and dug holes. I plant my orchard to garden crops, corn, and potatoes. I a plow shallow, and use a harrow and weed-cutter. I plant the same crops in a bearing orchard. Windbreaks are essential; mine are natural timber along the creek. I prune a little with knife and saw, to preserve shape; cannot say that it has been beneficial, or that it pays. I do not thin the fruit while on the trees; it would probably benefit. I fertilize my orchard some with stable litter. I think it beneficial, as the land is heavily cropped with truck. I would not advise it on all soils. I pasture my orchard with cattle, horses, and hogs, but do not think it advisable. I have not sprayed yet, but intend to when my orchard is older. I pick my apples by hand. I store apples for home use. With a dam across a creek, I raise water into a pond, and irrigate. Seepage, percolation and capillary attraction do the rest.

JAMES L. WILLIAMS, McDonald, Rawlins county: I have resided in Kansas nineteen years. Have an apple orchard of sixty trees, planted eight years; planted ten acres in 1895. I prefer for family orchard Jonathan, Rambo, Senator, Rawle's Janet, and Gano. I planted my orchard on a hillside; the small orchard is in the bottom; they have a clay subsoil, and slope in every direction, but would prefer a northern slope. I prefer three-year-old trees, set in holes dug four feet deep, five feet wide, filled in the bottom with soil hauled from the creek. [?] I cultivate my trees with a cultivator and harrow; I think the life of the tree depends on the cultivation, and that we will have to keep it up as long as the tree lives. I plant potatoes and turnips in a bearing orchard. Windbreaks would be a benefit, and should be made of Russian mulberry or red cedar, set in four or five rows around the orchard. For rabbits I rub axle grease on the trees. I commence pruning when I set the trees out, using a knife and saw, to keep the tops from getting too heavy and to give shape; I think it pays. Never have thinned the fruit while on the trees, but would if my trees should ever be overloaded; I think it would pay. I fertilize my orchard from the sheep corral; it keeps the ground moist and is food for the trees. Would not advise its use on bottom land, as the growth would be too rapid. I pasture my orchard with hogs, but do not think it advisable; it does not pay. My trees are troubled with grasshoppers and flathead borers. I dig borers out in the spring, then wash the tree with strong soap-suds, which I think eradicates all lice and insects that may be in the bark of the tree; it gives the tree a hearty, vigorous growth. I do not irrigate, but cultivate instead.

J. R. CALDWELL, Oberlin, Decatur county: I have lived in Kansas thirteen years. Have an apple orchard of 110 trees, thirteen years old, six inches in di-

ameter. For fall or winter market I prefer Winesap, Ben Davis, and Jonathan, and for summer, Cooper's Early White, Maiden's Blush, Red June, Winesap, Ben Davis, and Jonathan. Have tried and discarded Rawle's Janet; it is not a good bearer in this locality. I prefer upland, with a deep, rich loam, and an eastern slope. I prefer three-year-old trees, with lengthy bodies and not much top, set in holes dug three by three, one and one-half to two feet deep; fill the bottom with some of the same dirt. I cultivate my orchard to corn and potatoes ten or twelve years, using a cultivator and stirring plow; cease cropping after ten or twelve years. Windbreaks are essential; would make them of forest-trees, by planting or transplanting them. For rabbits I wrap the trees with corn-stalks. I prune to keep the limbs from rubbing; for any other reason it does not pay. I do not thin the fruit while on the trees. My trees are planted in rows. I fertilize my orchard with barn-yard litter; think it beneficial, and that it would be good for all soils. I do not pasture my orchard; it is not advisable, and does not pay. My trees are troubled with flathead borer and tent-caterpillar, and my apples with codling-moth. I do not spray. I hand-pick my apples and sell them in our home market. I do not dry or store any. Do not irrigate. Price has been one dollar per bushel. Dried apples have been from five to six cents per pound.

B. F. CAMPBELL, St. Francis, Cheyenne county: I have lived in Kansas since 1885. Have an apple orchard of 200 trees, from two to seven years planted. I prefer bottom land, subirrigated, that is sandy, with a northern aspect. I prefer one-year-old trees planted in rows twenty feet apart. I cultivate my orchard to vegetables as long and as often as I can, using a harrow; cultivate after every rain if possible, and the drier the ground, the oftener the better. Windbreaks are essential; would make them of cottonwood, as they make the finest growth with us. For rabbits I wrap the trees with cloth; have not been able to catch or poison the gophers yet. I prune to maintain low heads and to make shapely trees without forks, and think it beneficial. I never thin my fruit. Do not think it makes any difference whether trees are planted in blocks of one variety, or mixed up. I mulch my orchard to retain moisture; would not advise it on all soils, as the moles make their home in it and soon kill the trees. I do not pasture my orchard; do not think it advisable. The gophers have done more damage by cutting off the roots than all the other pests. Am also troubled with grasshoppers. Never have sprayed, but am going to this spring; will use the same chemicals as are used at the experiment station. I irrigate [sub]; can flood the ground, but do n't need to; it is wet enough without.

J. W. SOMER, Wilson, Ellsworth county: Have lived in Kansas twenty-two years; have an apple orchard of seventy-five trees. For all purposes I prefer Ben Davis, Winesap, and Smith's Cider. Have tried and discarded Arkansas Black, Lawver, Jonathan, and Rawle's Janet. I prefer limestone bottom land with southeast slope. I prefer two-year-old trees three to five feet tall. I cultivate my orchard two or three years with a common stirring plow and cultivator, and plant nothing. Windbreaks are essential; would make them of forest-trees, walls, or Osage hedge. They ought to be planted before starting the orchard. For rabbits I wrap my trees with corn-stalks. I prune only to make trees symmetrical. Do not thin my apples. I mulch my trees; think it beneficial, but would not advise it on all soils. Do not pasture my orchard. Trees are troubled with twig-borer.

J. D. GRIFFITHS, Kanopolis, Ellsworth county: Have lived in Kansas eight-
 een years; have an apple orchard of thirty trees. Have some trees planted on

bottom land. I cultivate my orchard to sweet corn as long as the trees will admit, using a plow and a one-horse, five-tooth cultivator. I prune to give trees good shape. I fertilize my orchard with well-rotted stable litter. Do not pasture my orchard. Am troubled with no insect but borers. I spray the trees when leafing out, and once a week for five or six weeks after that time, to ward off the insects. I probe for insects not affected by spraying. I do not irrigate. Prices have been from fifty cents to one dollar per bushel. Dried apples have been about eight cents per pound.

M. E. WELLS, Athol, Smith county: I have lived in Kansas twenty-six years; have an orchard of twelve acres, from five to fourteen years. For commercial purposes I prefer Ben Davis and Missouri Pippin; and for family orchard Early Harvest and Winesap. I prefer hilltop of thin clay, resting on yellow silt, with a northern slope. I prefer two-year-old, stocky trees planted in dead furrows. I cultivate my orchard to corn as long as there is space enough between the rows; use two five-tooth cultivators lashed together, and cease cropping after twelve years. Windbreaks are not essential. I protect against rabbits and borers by eternal vigilance in hunting them. I prune by cutting out limbs, so they will not crowd each other; think it pays. I do not thin the fruit while on the trees. My trees are in mixed plantings. I do not fertilize my orchard; I think shallow cultivation is better. I do not pasture my orchard with anything excepting chickens. Trees are troubled with tent-caterpillar; some worm affects my apples. I sometimes spray with lime and copperas, and have not been very successful. Insects not affected by spraying I dig out with penknife and wire. I pick my apples by hand from a common ladder; sort into three classes—first, smooth and free from worms; second, free from worms; the balance in the third grade. I sell apples in the orchard; also retail them. I handle the best apples very carefully, one at a time, and place in crates. Keep the second and third-grade apples at home; feed the culls to hogs. My best market is in the orchard; never tried distant markets. Never dry any. I store apples for winter in a cellar on shelves, one layer of fruit on each shelf—am successful; Ben Davis keeps best. Never tried artificial cold storage. Do not irrigate. Price has been fifty cents per bushel. I employ women, because they handle the fruit with more care than men do; I pay one dollar per day.

ISAAC CLARK, Oberlin, Decatur county: I have lived in Kansas ten years. I have 1250 apple trees, eight years planted, as fine as they can be. My market varieties are: Winesap, Missouri Pippin, Rawle's Janet, and Ben Davis, and for family I added Maiden's Blush, Red Astrachan, and Sweet June. I prefer clay soil, on hilltop; any slope is good. Plant trees in good condition and fine appearance, on ground plowed deep and disced just as deeply. I cultivate very often with five-tooth cultivator, and never quit. Every third year I plow with a one-horse diamond plow. I raised melons for the first three years; after that nothing. I have no use for windbreaks. I tie with corn-stalks, to protect against rabbits. I prune very little, to form the top, with knife and saw; keep straggling branches out. I use very little fertilizer; only on thin soil. I never pasture the orchard. Have some twig-borers and leaf-crumplers. I have never sprayed yet; it may soon be necessary. I have kept my trees tied up with corn-stalks for six years; the bodies are healthy; no sun-scald and no borers. My best market is at home. I have stored some for winter, in barrels in a cave, and find that the Winesap, Missouri Pippin, and Rawle's Janet keep best, the latter keeping until July. I have been able to sell in the spring at fifty cents per peck.

JOHN M. C. KROENLIN, Lincoln, Lincoln county: I have resided in Kansas twenty-one years. Have an apple orchard of 178 trees, from four to fourteen years old, three to twelve inches in diameter. For market I prefer Winesap and Missouri Pippin, and for family use Missouri Pippin, Cooper's Early White, and Winesap. I prefer bottom land, with a black loam soil and sandy subsoil; I believe a level location best. For planting I prefer two-year-old trees, set in holes dug three feet square and one and one-half feet deep; throw out all soil and use good surface soil; never apply water to the roots. I cultivate my orchard until the trees are seven years old, using a disc, and then a harrow to level the ground, and plant no crop. Windbreaks are essential; would make them of Russian mulberries, on south and west sides. I have cottonwood windbreaks on the east and north of my orchard; those on the east protect the trees from the morning sun, thereby lessening the danger when there is frost on the buds, and those on the north I keep trimmed high, so as to admit of a free circulation of air, which is a protection against frost. For rabbits I wrap my trees with corn-stalks, which I think the best way. I prune with an ax, knife, and saw, and think it beneficial and that it pays. I do not thin the fruit while on the trees. My trees are in mixed plantings. I fertilize my orchard with well-rotted cow-stable litter, which I think has been beneficial. I do not pasture my orchard; I do not think it advisable. My trees are troubled with canker-worm, but not bad, and my apples with codling-moth. I spray after the blossoms fall, with London purple (which will kill every time), for canker-worm. I stand on step-ladder and pick my apples by hand. I sell them in the orchard, at retail, and feed the culls to the chickens. Lincoln is my best market. Have never tried distant markets. Don't dry any; it does not pay. I am successful in storing apples in bulk in a cellar, and find Winesap and Missouri Pippin keep best. I do not irrigate. Prices have been from ten cents to two dollars per bushel, the same season; dried apples four cents per pound.

J. H. SAYLES & SON, Norcatur, Decatur county: Have been in Kansas fifteen years; have 300 apple trees, eight years planted, six inches in diameter. For market I planted Ben Davis, Winesap, Missouri Pippin, Winter Duchess (?), and I added for family use Jonathan, Duchess of Oldenburg, and Red June. I have tried and discarded the Mann, Walbridge, Baldwin, Northern Spy, and Red Astrachan. I have black, northwest Kansas prairie soil, with northeast slope. Our well is seventeen feet deep, and fruit never fails. Plant low, healthy, two-year-old trees, in deep furrows, plowed parallel with the slope, putting the trees twenty by thirty feet. I have raised some splendid seedlings. I draw on large quantities of stable litter. I grow nothing in the orchard; cultivate with double shovel, drag, and hoe, keeping the ground flat. I believe windbreaks are essential, and would make them of Russian mulberry and white elm, set one row of elm one year old, twelve to twenty-four inches, then two rows of Russian mulberry six feet apart, alternating. For rabbits I fence with wire. I prune with knife and saw, thinning out the tops, and think it pays. I believe in thinning the fruit as soon as it is large enough, and would plant mixed varieties. Our Jonathan never bore until the Ben Davis near by bloomed. I scatter stable litter as for grain, and it is beneficial, as trees not fertilized die out here; it is good on all kinds of soil. Never pasture the orchard. We have some leaf-roller, fall web-worm, and codling-moth, but have never sprayed any. We dig borers out with a wire. We pick by hand, and sort into three grades: numbers 1 and 2, and cider stock. We never sell in the orchard, but retail our best in one-bushel crates. Our culls we feed out to farm stock early. Our best market is at home

and west; never tried distant markets. Have never tried drying or storing for winter. Do not irrigate, but cultivate often. Prices range from 60 cents to \$1.25 per bushel. We use some farm help at fifteen to eighteen dollars per month.

W. J. BRUMAGE, Beloit, Mitchell county: Have lived in Kansas twenty-four years; have an orchard of 1000 very large apple trees, from twelve to twenty years old. For commercial purposes would prefer Ben Davis, Winesap, Missouri Pippin, Duchess of Oldenburg, Early Harvest, Red June, Willow Twig, Maiden's Blush, Cooper's Early White, and Pewaukee, and for family orchard Ben Davis, Winesap, Early Harvest, Maiden's Blush, and Duchess of Oldenburg. I prefer hilltop, clay loam, with northeast slope. I plow a ditch and set two-year-old trees a little deeper than they were in the nursery. Have tried root-grafts and seedlings; were no good. I cultivate with garden-truck until twelve or fourteen years old, using a plow to stir the ground, and seed bearing orchard to grass. I use no windbreaks. I prune to keep the tree from getting bushy; I think it beneficial. I never thin my fruit. Cannot see any difference in trees whether planted in blocks or mixed up. Use no fertilizer, and would not advise its use. Do not pasture orchard; do not think it advisable. My trees are troubled with canker-worm, flathead borers, twig-borer, and leaf roller. Codling-moth and curculio trouble my fruit. I spray with London purple, using a pump, just after the blossom falls, for the codling-moth, and think I have reduced them. I pick my fruit by hand, and pack in barrels. I sort into two classes, good and bad. Have sold them in the orchard; sometimes retail; my best market is home; have never tried distant markets. I make vinegar of the culls. Never dry any. Store some for winter market in bulk in a cave; am successful; Winesap, Willow Twig and Ben Davis keep the best. Have never tried artificial cold storage. Have to repack stored apples before marketing; we lose about one-fourth. Do not irrigate. Prices average about fifty cents per bushel.

JOHN E. DAVID, Winona, Logan county: Have lived in Kansas thirteen years; have an apple orchard of ninety trees from seven to ten years old. I prefer level land, black loam with a clay subsoil, and an eastern slope. I prefer thrifty, healthy trees, set in holes three feet deep. I cultivate my orchard to beans and melons, using a cultivator and plow for six years; then cease cropping. Windbreaks are essential; would make them of honey-locust, planted in rows on north [?] and south. For protection from rabbits I use wire screening, and dig the borers out. I prune my trees with a knife to give big growth, and think it beneficial. I never thin my apples while on the trees. My trees are planted in blocks. I fertilize my orchard with stable litter; think it beneficial and would advise it out here. I never pasture my orchard. Am not troubled with insects. Do not spray. Do not irrigate.

P. F. JOHNSON, Oberlin, Decatur county: Have lived in Kansas seven years; Have 200 apple trees, four to eight years old, and seven to fifteen feet high. For commercial purposes I prefer Ben Davis. For family use, Red June, Winesap, Grimes's Golden Pippin, Jonathan, and Ben Davis. I prefer bottom land, with deep, black loam and clay subsoil, north slope. I plant two-year-old trees, in rows north and south, as close as the different varieties will allow. I cultivate as long as the trees live, with plow and cultivator, allowing them to go no deeper than three inches. I plant the young orchard to beans, pumpkins, and squashes; the same in a bearing orchard, and never cease cropping. Windbreaks are

essential. I would make them of Russian mulberry and ash, and keep them cultivated. I tie dry corn-stalks around young trees to protect from rabbits. Never prune. Never thin. I use stable litter as a fertilizer and mulch; I think it advisable in this latitude. I pasture my orchard in fall and winter with hogs, and think it advisable. My trees are troubled with roundhead borer, twig-borer, and grasshoppers. I do not spray. Have never irrigated, but intend to soon. Prices have been from \$1 to \$1.50 per bushel.

W. B. STOCKARD, Beloit, Mitchell county: I have lived in the state since 1871. Have an apple orchard of 800 trees. For all purposes I prefer Missouri Pippin, Winesap, Jonathan, and Jefferis. Have tried and discarded Ben Davis and Limber Twig. I prefer bottom land with a clay subsoil; southeast slope. I prefer two-year-old trees, planted twenty-four feet apart, then thin them out when they crowd. I cultivate my orchard to corn and potatoes, using a cultivator and drop harrow, and cease cropping when about six years old; plant nothing in a bearing orchard. Windbreaks are not essential. To protect the trees from rabbits I rub with rabbits' blood, and whitewash for borers. I prune very little; remove dead limbs, and clip the others; think it beneficial if not too severe. I do not thin my fruit while on the trees; it does not pay. It is not necessary to set trees in mixed plantings when you keep bees. I fertilize my orchard with stable litter; think corn-stalks best, it has proven beneficial; would advise its use on all soils. Do not pasture my orchard; is not advisable; does not pay. My trees are troubled with tent-caterpillar, bud moth, root aphid, bag-worm, roundhead borer, woolly aphid, twig-borer, oyster-shell bark-louse, and my apples with curculio. I spray just before the bud swells, and after they bloom, with white arsenic; sal soda and lime for canker-worms and moths; think I have reduced the codling-moth. I hand-pick my apples; sort into two classes. Sell in the orchard, wholesale, retail, and peddle; keep the best apples at home; make vinegar of the second and third grades, and culls. Never tried distant markets. Find a ready market for dried apples; but it does not pay. I store apples for winter use in a circular arched cave, in barrels; find Winesap and Missouri Pippin keep best. I do not irrigate. Price has been fifty cents per bushel.

P. WAGNER, Dresden, Decatur county: I have lived in the state twelve years. Have an apple orchard of fifty trees, planted last spring. I prefer hilltop, with an east or north aspect. I cultivate my orchard with a cultivator and harrow, growing no crop. Would make windbreaks of locust trees. For rabbits I use barrel staves. I do not prune, or thin the fruit while on the trees. My trees are in mixed plantings. I fertilize my orchard with stable-litter, and think it beneficial, and would advise its use on all soils. I do not pasture my orchard; do not think it advisable; it does not pay. I do not spray. I water my orchard. Apples have been one dollar per bushel; dried apples, five cents per pound.

JOHN ELDER, Glen Elder, Mitchell county: I have lived in Kansas twenty-seven years; have an apple orchard of 280 trees, from twelve to twenty-six years planted. For family orchard I prefer Cooper's Early White, Early Harvest, Chenango Strawberry, Maiden's Blush, Missouri Pippin, and Ben Davis. Have tried and discarded Willow Twig, Lowell, and White Winter Pearmain, on account of blight and sun-scald. I prefer hill land, with black loam soil and clay subsoil; a north-east slope. I prefer two-year-old trees, planted in dead furrows. I cultivate my orchard to corn for a number of years, using a lister, while the trees are young, and a disc when they get older. I cease cropping after six or

eight years, and plant nothing in a bearing orchard. When windbreaks are close enough to do good they sap the ground too much. I wrap the trees to protect them from rabbits, and keep them growing and healthy, for borers. I prune my trees, and think it beneficial. I do not thin the fruit on the trees. I fertilize my orchard with stable litter, and think it keeps a tree healthy and growing, which will protect it from borers and other insects. Do not pasture my orchard; do not think it advisable. My apples are troubled with curculio and gouger. I have sprayed after the blossom fell, with Paris green, London purple, and blue vitriol: do n't know that I reduced the codling-moth any. For insects not affected by spraying I bored a one-half inch hole in the trees this spring and filled it with sulphur; then plugged it up. [?????] I sell apples in the orchard; also retail. I do not dry any. Prices have been from twenty-five cents to one dollar per bushel.

C. A. PERDUE, Beloit, Mitchell county: Have lived in Kansas eighteen years. Have an apple orchard of about 250 trees. I prefer the Missouri Pippin for commercial purposes. I prefer a black loam soil with a clay subsoil; north slope. In planting trees, I would set them thirty feet apart; mine are twenty feet and are too close. I have cultivated my orchard, but think I did not do it right. A light culture to keep the soil loose on top, to act as a mulch, would, I think, be beneficial. Think it best to grow no crop in the orchard. I think windbreaks would be beneficial. For rabbits I use woven wire. I prune to lessen the tops; I think it ought to be done every year, so as never to cut any large limbs; I think it pays. I do not thin the fruit while on the trees, but think it would be an advantage. I have put stable litter in my orchard two or three times during the last fifteen years, but do not think it necessary; the land is rich enough without; would not advise its use on all soils. I do not pasture my orchard; it is not advisable; it does not pay. My trees are troubled with canker-worm, tent-caterpillar, bud moth, and flathead borer. I do not spray. Always sell in the local market. I do not dry any. I store some for winter use, in a cellar in boxes, barrels, and bins. We have to repack stored apples before marketing. Prices for winter apples have been from fifty to seventy-five cents.

CHAS. VAIL, Colby, Thomas county: I have lived in Kansas twelve years; have an apple orchard of 150 trees seven years old, from seven to eleven feet. I plant my orchard to corn and potatoes for two or three years, then nothing; use a common cultivator. Windbreaks are not essential. For rabbits I use tar paper. I prune very little, and rub off young sprouts. Can see no difference whether trees are in blocks of a kind or mixed plantings. I do not fertilize my orchard; it is very injurious here. I do not pasture my orchard. My trees are troubled with tobacco worms [?] and grasshoppers. I do not spray. Do not irrigate.

HUDSON BROS., Kanopolis, Ellsworth county: Have lived in Kansas thirty-four years; have an apple orchard of fifty trees, six to thirty years old, from four to eighteen inches in diameter. For commercial purposes I prefer Ben Davis, Missouri Pippin, and Winesap, and for family use would add Duchess of Oldenburg. I prefer sandy bottom land. I plant three-year-old trees thirty feet apart each way, in well-plowed land. I cultivate my orchard to corn or potatoes till the trees are ten years old; sow rye in bearing orchard; mow in June, and then plow; never have ceased cropping. Windbreaks are essential; would make them of forest-trees planted in a belt around the orchard. I fertilize my orchard

with barn-yard litter; think it beneficial; would advise its use to a certain extent on all soils. I pasture my orchard with hogs, and think it advisable. My trees are troubled with flathead borers. I do not spray.

E. W. O'TOOLE, Collyer, Trego county: I have resided in Kansas nineteen years. Have an apple orchard of sixty-four trees, twenty-two of which are fourteen years old, and thirty-seven inches in circumference. For commercial orchard I prefer Ben Davis, and for family Early Harvest and Winesap. I prefer black loam with sandy bottom, south slope. I plant two-year-old trees, in rows eighteen feet apart. I do not cultivate my orchard, but mulch it with hay for four years. Windbreaks are essential here; would make them of cottonwood trees, planted in rows around the orchard. For protection against rabbits I use whitewash and tar paper. I prune to thin the tops; think it beneficial. The wind thins my apples for me. I fertilize my orchard with hay; think it beneficial, and would advise its use on all soils. Do not pasture my orchard. I shall spray this year after the bloom falls with London purple and lime water. I peddle my apples. This is the best market, because they are scarce. I am successful in keeping a few bushels in a pit; the Missouri Pippin keeps best. I do not irrigate. I am located on bottom land. Price has been one dollar per bushel.

M. A. WILSON, Atwood, Rawlins county: I have resided in the state nineteen years; have an apple orchard of fifty trees ten years old, six inches in diameter. For all purposes I prefer Winesap and Ben Davis. I prefer bottom land with a dark loam and a clay subsoil, with a northern slope. I prefer two-year-old trees with good tops and stocky bodies, set in early spring, sixteen to twenty feet apart. I plant my orchard to corn, potatoes, and garden-truck, using a hoe and cultivator; have never ceased cropping. Windbreaks are essential; would make them of Russian mulberries planted twelve feet apart each way; trim and cultivate them. For rabbits I wrap the trees with rags or burlap cut in strips three or four inches wide; begin at the bottom and wind up; if the limbs are near the ground, wrap them, too. I prune with a small keyhole saw and shears to keep the tree hardy, and think it pays. I thin my apples when they are about half grown; it pays. I fertilize my orchard with stable litter; it has been beneficial, and would advise its use on all soils. Do not pasture my orchard. Trees are troubled with tent-caterpillar and flathead borer. I do not spray. I stand on a step-ladder and pick my apples, laying them in the baskets as carefully as though they were eggs. I sort into two classes—best, and second grade. I sell apples in the orchard; retail the best, second and third grades; use and sell the culls. Home is my best market. I do not dry or store any for winter market. I irrigate, lifting the water twenty feet by an elevator and horse power from creek. Prices have been from \$1 to \$1.60 per bushel. Dried apples, sixteen pounds for one dollar. I employ hands at from fifteen dollars to eighteen dollars per month.

F. T. M. DUTCHER, Phillipsburg, Phillips county: I have lived in Kansas twenty-six years; have an apple orchard of 100 trees from eight to ten years old. For market I prefer Missouri Pippin, Ben Davis, and Winesap, and for family orchard Ben Davis and Winesap. I prefer a bottom which has a sandy soil and a clay subsoil, with a northeast slope. I set two-year-old trees in listed ditches. I plant my orchard to potatoes as long as possible; use a five-tooth cultivator; cease cropping when the trees shade the ground, and plant nothing in a bearing orchard. Windbreaks are not essential. For rabbits I tie corn-stalks around

the tree, leaving them on the year round. I prune my trees with a knife; think it beneficial, and that it pays. I thin apples, if necessary, as soon as established. I fertilize my orchard with stable litter, and would advise its use on all soils. I never pasture my orchard; do not think it advisable. My trees are troubled with borers, and my apples with curculio. I do not spray. I dig borers out. I make only one grade of my apples, and feed the culls to pigs, and use all the rest at home. I do not dry any. I irrigate a little; have a pond around the trees.

D. E. STEVENS, Norton, Norton county: I have resided in the State eighteen years. Have an apple orchard of 100 trees from ten to fifteen years old, three to six inches in diameter. My orchard should be composed of Ben Davis, Missouri Pippin, Pewaukee, Jonathan, Willow Twig, Maiden's Blush, Snow and two kinds of Russets (and I have n't a Russet in the orchard!!), Early Harvest, one or two sweets (and I have n't a sweet in the orchard!), which proves to me that an agent will sell you any variety you want, and ship what they happen to have. I prefer bottom land with a loamy soil and a clay subsoil, with a northern slope. I prefer three-year-old, low-top trees, cut back, set in a furrow made with a lister and dug out with a spade. I plant my orchard to corn, using a stirring plow and harrow, and am still cultivating; would plant corn or clover in a bearing orchard. Windbreaks are essential; would make them of Russian mulberries. For rabbits I wrap with fine meshed wire. I prune my trees with a saw and knife to give sunlight, and make larger fruit; think it pays. I do not thin the fruit while on the trees. My trees are in mixed plantings. I mulch my orchard late in the fall with coarse manure; would advise it on all soils, unless very rich. Feed your soil if you would have thrifty trees. I pasture my orchard with hogs; I think it advisable, and that it pays because they keep the soil loose. Trees are troubled with canker-worm, tent-caterpillar, and borers; and my apples with worms. I do not spray, but ought to. I hand-pick my apples. I dry some for family use. I do not irrigate, but am confident we need more water.

JESSE ROYER, Gove, Gove county: Have lived in Kansas thirteen years. I have four apple trees seven years old. I prefer upland with an eastern or northeast slope. For planting, I prefer good two-year-old trees. I cultivate my orchard all the time; would plant corn, and cultivate with any tool that would do good work and kill the weeds; would not plant any crop in a bearing orchard. Windbreaks are essential; would make them of any kind of forest-trees excepting walnut; plant two or three rows of them all around the orchard. I prune some to give shape to trees and take out all dead branches, and think it pays. I think a good rich [?] mulching would be beneficial, and would advise its use on all soils. Do not pasture my orchard. I would spray if it was necessary; insects are not very bad here. I do not dry any.

FRUIT DISTRICT No. 3.

Following is the third fruit district, comprised of thirty-one counties in the southwest quarter of the state. Reports, or rather experiences, from each of these counties will be found immediately following. We give below the number of apple trees in the third district, compiled from the statistics of 1897. Many thousands were added in the spring of 1898.

	<i>Bearing.</i>	<i>Not bearing.</i>	<i>Total.</i>
Barber	12,901	16,384	29,285
Barton	25,146	24,196	49,342
Clark	735	1,942	2,677
Comanche	1,010	1,512	2,522
Edwards	3,378	6,672	10,050
Finney	6,139	10,559	16,698
Ford	2,281	4,178	6,459
Grant	852	300	1,152
Gray	410	2,715	3,125
Greeley	10	402	412
Hamilton	741	2,242	2,983
Harper	36,296	20,508	56,804
Haskell	328	141	469
Hodgeman	415	675	1,090
Kearny	4,405	7,312	11,717
Kingman	39,249	23,416	62,765
Kiowa	1,683	2,212	3,895
Lane	1,647	2,524	4,171
Meads	1,340	2,200	3,540
Ness	1,188	1,630	2,818
Pawnee	11,137	7,800	18,937
Pratt	12,894	12,963	25,857
Reno	141,460	280,713	422,173
Rice	65,069	45,133	110,202
Rush	2,118	2,629	4,747
Scott	229	1,936	2,165
Seward	432	602	1,034
Stafford	22,914	27,377	50,291
Stanton	10	150	160
Stevens	897	1,651	2,548
Wichita	90	959	1,049
Total in district	397,304	513,633	910,937
Estimated acreage	60,000	100,000	160,000

D. J. McNEAL, Scott, Scott county: I have lived in Kansas ten years; have an apple orchard of sixty-five trees five years old, seven feet high. I prefer a clay soil with a north aspect. I plant two-year-old trees in ground that has been plowed for two years before planting. I cultivate my orchard with a disc harrow and cultivator, and plant nothing. Windbreaks are essential; would make them of cottonwoods. I rub rabbits' blood on the trees to protect them from other rabbits. I prune my trees with a knife and a fine saw; I think it beneficial. I have fertilized my orchard with stable litter, but it causes a too rapid growth; I would not advise its use on all soils. I do not pasture my orchard; it is not advisable; it does not pay. I am not troubled with insects, and do not spray. I do not irrigate, but think it would pay.

G. O. VICK, Fowler, Meade county: Have lived in Kansas fourteen years. I planted an apple orchard twelve years ago; have about fifty Missouri Pippins that have not failed to give us a crop for seven or eight years; last fall we got three bushels from a single tree—the most ever taken from one tree by us. They are fine keepers, and are said to be much better, both in color and flavor, than those grown farther east. We have kept them in fine condition until July following, and then the supply gave out. Have no trees where they can be irrigated, but hope to put out an orchard next spring that can be irrigated. I have the finest location [for irrigation] in the West, and will do my best. I prefer valley land, with a southeast slope. Prices have been two dollars per bushel.

C. A. BLACKMORE, Sharon, Barber county: I have lived in the state about five years; have an orchard of 1100 apple trees, three years old, two inches in diameter, seven feet high. For market I prefer Ben Davis, Missouri Pippin, Wine-sap, Early Harvest, Benoni, and Maiden's Blush. When planting a family orchard select varieties from the earliest to the latest, that they may be well supplied. In planting a commercial orchard I would study the wants and demands of the people, also the varieties best adapted to our soil and climate. Do not be like an experiment station and plant all varieties catalogued. A mongrel orchard, like mongrel stock, is not good property. The man who has a hundred bushels of some one good variety of apples can always get the best price for them; but if the hundred bushels consisted of ten or a dozen varieties there would not be enough of any one variety to attract a buyer, and consequently he must take what he can get for them. Select such varieties as the market demands, and then confine your planting to as few varieties as possible, and your commercial orchard will attract buyers. I prefer a bottom, with a dark, sandy or red land, with a reddish clay subsoil, north or northeast slope. I plant thrifty two-year-old trees, in ground plowed deeply and marked off with a lister sixteen by thirty feet; then set the trees four to six inches deeper than they stood in the nursery, in holes dug at the crossings. I haul my trees to the field in a barrel two-thirds full of water, take them out one at a time and trim all the broken and long roots, arranging them in natural positions and turning the ends down in the hole, leaning the tree toward the two p. m. sun; then I fill the hole, using a rammer while a boy shovels the dirt in. If the soil is dry pour two or three gallons of water on the roots. When the water has soaked away finish filling the hole, and tramp the soil lightly around the tree. When they are all set, cut them well back.

I cultivate my orchard from early spring to the 1st of September, using a plow, cultivator, and disc; I plant corn in a young orchard, and cease cropping after eight years, and plant nothing in a bearing orchard. Windbreaks are essential on the south and west, and I would make them of Russian mulberries. For rabbits I rub rabbits' blood on the trees twice during the winter. Borers I cut out the first year; after that I drown them out by cultivation. I prune my trees while they are small, to give shape. I think it pays, as you do not have to cut off large branches when grown. Do not have to thin fruit here in Kansas. I do not plant a solid block of any one kind of trees; I intermingle the varieties in alternate rows, and insure more perfect pollination. I fertilize my orchard with stable litter; it pays especially well on sandy soil, and I would advise its use on all soils. Do not expect your trees to produce something for nothing; feed them. I do not pasture my orchard; it is not advisable, and does not pay. My trees are troubled with canker-worm, tent-caterpillar, bud moth, root aphid, bag-worm, flathead borer, roundhead borer, woolly aphid, twig-borer, and oyster-shell bark-louse, and my apples with codling-moth. I do not spray. Hunt the insect

eggs and nests in your trees, and destroy the source of much loss to your fruit this season. In picking, I use a ladder to reach the apples in the top of the trees; put them in a grain sack over my shoulder with a stick in the mouth; have gathered sixty bushels per day for weeks at a time in this way. Prices have been from one dollar to two dollars per bushel, and dried apples five to eight cents per pound.

A. D. EINSEL, Greensburg, Kiowa county: I have lived in the state twelve years. I plant thrifty one-year-old trees, in holes large enough to receive the roots, cover the roots with earth, and then pour in a pail of water. When this is soaked away fill the hole nearly full of earth. I cultivated my orchard to corn, using a spring-tooth harrow, to keep the soil loose and kill the weeds. Am going to plant another apple orchard. I think western Kansas will yet grow apples.

A. N. PATTERSON, Ford, Ford county: I have lived in Kansas seventeen years. Have an apple orchard of 100 trees five years old. I fertilize my orchard with stable litter. Do not pasture my orchard; do not think it advisable. I do not irrigate.

JOHN HINDS, Olcott, Reno county: I have resided in the state thirteen years. Have an apple orchard of 500 trees; 375 of them are three years old, and the balance eight years old. For commercial orchard I prefer Ben Davis, Missouri Pippin, Winesap, Rawle's Janet, and Grimes's Golden Pippin; and for family orchard Early Harvest and Maiden's Blush. I have tried and discarded Greening, Baldwin, and Missouri Keeper. I prefer a sandy bottom with a clay subsoil, and eastern aspect. I prefer three-year-old trees, set in the spring. I prune the roots and tops when setting. I plant my orchard to corn or potatoes for six or eight years; plow shallow; cease cropping after eight years, and plant nothing but clover and orchard-grass in a bearing orchard. Windbreaks are essential; would make them of mulberries planted one or two feet apart all around the orchard. For rabbits I make a varnish and apply to the trees in the fall. I prune my trees in June when they are large, so as to let in light and sun; I use a tree pruner; think it pays. I do not thin the fruit while on the trees. My trees are in mixed plantings. I fertilize my orchard with stable litter, but do not put it close to the trees; I think it beneficial, and would advise its use on all soils. I pasture my orchard with hogs; I think it pays. My trees are troubled with fall web-worm and leaf-roller. I do not spray. I pick my apples by hand: sort into three classes from piles. Pack them in barrels and haul to market on wagon. I sell apples in the orchard at retail. Make vinegar of the culls. I store some apples for home use. Price has been one dollar per bushel.

HENRY MILLER, Ulysses, Grant county: Have lived in Kansas fifteen years. I have 256 apple trees, nine and ten years planted, from three to five inches in diameter. I grow for market Missouri Pippin, Winesap, and Ben Davis, adding for family use Maiden's Blush and Grimes's Golden Pippin. I prefer bottom land, northeast slope, sandy soil, and gypsum subsoil. I plant in squares twenty-four by twenty-four feet. I have cultivated up to date with stirring plow and cultivator. I grow garden-truck among my trees until seven years old; after that nothing. I believe windbreaks essential in this county, and would make them of Russian mulberry, cottonwood, and locust. I would plant on the outside a row of mulberry four feet apart; next, a row of cottonwood or locust eight feet apart. To prevent destruction by rabbits I rub with fresh blood. I prune with

a knife to prevent watersprouts from getting too thick; I am sure it pays, and lets sunshine into the center of the trees. I use stable litter, straw or rotted hay for fertilizer. I do not pasture my orchard, and have no insects but grasshoppers. Our crop has been light, owing to dry weather. I sell largely in the orchard. Our best market is at home. We dry a few for home use. I keep some for winter use, in a cave dug out and covered with earth. I do not irrigate. The prevailing price for apples is one dollar per bushel, and of dried apples, six cents per pound.

E. T. DANIELS, Kiowa, Barber county: I have lived in the state twenty-five years. Have an apple orchard of 150 trees, from ten to sixteen years old, four to eight inches in diameter. For market I prefer Missouri Pippin, Winesap, Jonathan, Twenty-ounce Pippin, Maiden's Blush, and Rawle's Janet. Would plant the same varieties for a family orchard. Have tried and discarded Ben Davis, Early Harvest, Smith's Cider, Lawver, Fink, Walbridge, and McAfee; they will not stand the heat and drought. I prefer bottom land, with heavy loam and red subsoil, southeast slope, sheltered from north and south winds. I prefer a good yearling tree, planted in a dead furrow; after planting, plow two furrows to the tree, and then harrow. I plant my orchard to corn for two years only, using a twelve-inch plow, cultivator, and harrow. I cultivate my orchard as long as it lives, and plant nothing in a bearing orchard. Windbreaks are essential on the south and north; would make them of a belt of deciduous trees, six rods wide on the north, and one-half as wide on the south; would make this of native trees—elm, ash, or mulberry. For rabbits I wrap the trees with hay. I prune my young trees with the thumb and finger mostly, forming low heads; bearing trees I prune very little, except to take out the blighted limbs. I thin my apples when too full, when about the size of marbles; believe it pays. My trees are in mixed plantings. I fertilize my orchard with stable litter and ashes, but cannot see any benefit; think it would do no harm, unless heavy coats of coarse manure are plowed under. Never have pastured my orchard, but am going to very soon; am fencing now, so I can turn in hogs. My trees are troubled with twig-borer, and my apples with codling-moth. I do not spray. I sell apples in the orchard, and peddle the best second and third grades; give the culls to the hogs. My best market is in Oklahoma; never have tried distant markets. I am successful in keeping apples for family use in bulk in a cyclone cellar dug in the red rock. Missouri Pippin keep the best for me. Prices have been from fifty cents to one dollar per bushel.

D. D. WHITE, Enon, Harper county: Have lived in Kansas twenty years; have 500 apple trees planted from three to eighteen years. For commercial purposes I prefer Ben Davis, Missouri Pippin, and Winesap. For family orchard I would add Maiden's Blush and Grimes's Golden Pippin. I prefer sandy bottom with an eastern slope. I would plant yearling trees, with every limb cut off, in rows twenty feet north and south, and forty feet east and west. Cultivate with double-shovel plow until they get too big to get among them, and grow nothing near them. I believe in a windbreak of mulberry, or any trees planted thickly, on the south. I prune only so that I can get under the trees. I use plenty of barn-yard litter, for it pays in the orchard. I pasture my orchard with hogs, and think it advisable, as it pays. I have sprayed, but never saw any good in it. I dig the borers out with a wire, unless they are in the heart of the tree, and then there is no help for the tree. I pick from a step-ladder, and sort into three classes: windfalls, wormy, and perfect. In picking we drop the decayed and

gnarly to the ground, carry the rest in baskets to the barrel, put the perfect ones in one barrel, and the others in another. Do not disturb the best ones until you sell; the others should be sorted again before you sell. I sell some in the orchard, but peddle mostly; my best I sell to the stores in the spring; of the culls I make cider. My best market is the towns in the "Strip." I dry some satisfactorily on a cook-stove evaporator, pack in flour sacks, and find a ready and profitable market for them in the spring. I store successfully for winter in bulk and in barrels in a cave with eighteen-inch wall arched over from the bottom. I find that Ben Davis, Missouri Pippin and Winesap keep the best. We lose, perhaps, one-sixteenth. I do not irrigate. Prices range from 50 cents to \$1.50 per bushel, and dried apples from five to twelve cents per pound. I use only farm hands at fifteen dollars per month and board.

AMOS JOHNSON, Ellinwood, Barton county: Have been in Kansas twenty-three years; have an orchard of 2000 apple trees, planted from three to twelve years. Varieties for market: Winesap, Missouri Pippin, Smith's Cider, and Northern Spy; for family use, Winesap, Missouri Pippin, Smith's Cider, Maiden's Blush, and Red June. Have no use whatever for Ben Davis. Prefer bottom land, with black, sandy soil and a southern aspect. Plant good, thrifty two-year-old trees 25 x 25 feet. I plant corn or potatoes for three or four years, and after that nothing; thoroughly cultivate with the plow, disc, and harrow. I think a windbreak on the south side very essential, and would make it of cottonwood and Russian mulberry, in five rows, alternating, six feet apart. I use soap and turpentine for the borers, and hounds for the rabbits. I believe pruning pays, and makes the fruit much nicer. I use common pruning shears, and prune so that the sun can get in. Never have thinned apples on the trees, but believe it would be a good thing. I believe in fertilizing with stable litter; think it keeps the orchard thrifty and more fruitful. I have never kept any stock in the orchard, but believe it would be advisable and no detriment to pasture with hogs in June and July. Have never sprayed any. I pick from step-ladders into baskets, and sort into three classes: No. 1 are sold in barrels, No. 2 in bulk, and No. 3 go for cider. I have sold a few wagon-loads in the orchard, but I sell my best apples by the bushel late in winter; I usually sell the second-grade apples first, and make the culls into cider. My best market is in the counties north and west of us; have never tried a distant market. Never dried any. For winter we store in barrels, and are successful. The Missouri Pippin and Willow Twig keep best. I irrigate on a small scale. Prices average about one dollar per bushel.

S. S. DICKINSON, Larned, Pawnee county: Has lived in Kansas thirty-three years, and has an apple orchard of 1800 trees, planted from seven to fifteen years. For commercial purposes he prefers Missouri Pippin, Winesap, Willow Twig, Ben Davis, and Rome Beauty, and for family use adds early apples. Has tried and discarded Red Winter Pearmain, because of blight. He is located in river bottom, with sandy soil, and a blue clay subsoil. Prefers a north and east slope. Plants two-year-old trees, with heads two feet from the ground, in deep dead furrows. Cultivates until the middle of July with a disc harrow, plow, and weeder. Never ceases cultivation. In the young orchard he plants corn, potatoes, and garden-truck, and would plant the same in a bearing orchard, and cease cropping when the trees got too large. Windbreaks are essential; would make them of any fast growing timber, by planting two rows, six to eight feet apart, and three feet in the row. For borers and rabbits he uses paint, whitewash, and poison.

He prunes his trees with a knife and shears, and thins out the tops to let the sun in, and thinks it pays, and is beneficial. He thins the fruit as soon as he sees that it is too thick. His trees are in mixed plantings, and fertilized with all the stable litter he can get. He finds it beneficial, and would advise its use on all soils. Does not pasture his orchard, excepting in late fall and early winter, when he lets the calves run in to tramp the ground, and thinks it advisable. His trees are troubled with canker-worm, bark-louse, and some other insects; and his fruit with codling-moth. He sprays his trees twice before the buds open, with Bordeaux mixture and arsenical solution, for blight; thinks he has reduced the codling-moth. Picks his apples from the trees into sacks, and hauls in a padded wagon box. Sorts them from tables into three classes—extra, good, and medium. Never sells apples in the orchard; wholesales, retails and peddles them. His best market is at home, but he has not enough to fill it. Does not dry any. Is successful in keeping a few apples for winter market in barrels and boxes in a cellar, as near air-tight as possible. They keep well until May 25, and he does not find it necessary to repack stored apples before marketing. He does not irrigate. Prices have been: Wholesale, 60 cents to \$1.20 per bushel; retail, 80 cents, \$1.40 to \$1.60 per bushel. He employs good help at one dollar per day and board.

F. F. HANSBERRY, Larned, Pawnee county: Have resided in Kansas twenty-three years. Have 1400 apple trees nine years planted. For market, Ben Davis, Winesap, Red Edgar (?), Haas, and for family orchard Ben Davis, Winesap, Maiden's Blush, and Whitney (crab) No. 20. I have discarded the Missouri Pippin, as the tree is too short-lived. I prefer second bottom, with sandy soil and clay subsoil; always choose north or northeast aspect. I always plant good one-year-old trees, twenty by thirty feet apart, putting Missouri Pippins between the wide way, to be cut out later on. I grow and graft all my trees. Cultivate with a disc cultivator until the trees come into full bearing; after that every second year. I grow no crop in the orchard. I believe windbreaks are essential on south side; I think mulberry trees best, and would plant a double row two feet apart, in rows four feet apart, the nearest row forty feet away from apple trees. I shoot and trap the rabbits. I only prune enough to keep the tree well balanced. I often thin Winesaps on the tree because I think they need it, and it pays. I believe in mixed plantings, and therefore plant Ben Davis among all the others. I spread stable litter among my trees after they come into bearing; sandy soil, I think, requires the most fertilizer. I pasture in a small way, putting my little calves in, in the spring. Am only bothered with a few codling-moth and flat-headed borers. I do not spray, but I make way with all the fallen fruit. I hunt borers and kill with a wire. Pick by hand as soon as well colored; sort into two classes; the best is first, and all sound smaller fruit second. We pack in barrels by hand, marking with the variety and class. We sell ours all at home; usually they are engaged before they are picked. Our second grade we keep at home; culls are made into cider. Our apples are sold in Dodge City and Larned. Have never shipped any; have never dried any. I store some second grade in barrels and bulk in the cellar, and find that Missouri Pippins, Ben Davis, and Winesaps keep the best, and I do not lose over three per cent. Some seasons I irrigate, with windmills. Prices vary from 75 cents to \$1.25 per bushel.

L. G. MORGAN, Richfield, Morton county: I have lived in Kansas forty-three years; have an apple orchard of 125 trees, medium size, ten years old. For all purposes I prefer Missouri Pippin, Winesap, and Maiden's Blush. I prefer black loam bottom, with clay subsoil, northern slope. I plant two-year-old trees

with small tops, well rooted, in large holes, and filled in with well-worked soil. I cultivate my orchard on vines, using a stirring plow and hoe, and cease cropping after six years, but keep cultivating, and plant nothing in a bearing orchard. Windbreaks are essential; would make them of forest-trees planted in hit-and-miss rows around the orchard. Am not troubled with rabbits and borers. I prune with a saw and knife to give shape; think it beneficial. I thin apples on the trees as soon as large enough. My trees are in mixed plantings; Maiden's Blush are surrounded by Pippins and Rambos. I think they are more fruitful. I do not fertilize. I pasture my orchard with chickens and turkeys; I think it advisable, to keep out bugs. Trees are troubled with tent-caterpillar. I pick my apples by hand into baskets from step-ladders, and sort into three classes, choice, common, and culls, while gathering. I pack in barrels, placing a layer in the bottom, mark with paint, and haul to market on a wagon. I sell apples in the orchard, also retail to merchants; make cider of culls. Richfield is my best market. Do not dry any. Am successful in storing apples for winter in boxes and barrels in cellar; find Missouri Pippin and Winesap keep best. Lose about two per cent. of the stored apples. I irrigate my trees direct from a well, in ditches running close to the trees. Price has been one dollar per bushel.

E. MORGAN, Hutchinson, Reno county: I have lived in Kansas seventeen years; have sixty acres of apples, from four to sixteen years old. For commercial orchard I prefer Missouri Pippin, Ben Davis, and Winesap; and for family orchard Early Harvest, Cooper's Early White, Maiden's Blush, Jonathan, and Grimes's Golden Pippin. Have tried and discarded Snow and Early Pennock on account of blight. I prefer river bottom with a clay subsoil. I plant two-year-old, large, thrifty trees, at the crossings of furrows made with a lister, twenty by thirty feet. I cultivate for the first four years to corn and garden-truck, using a Planet jr. cultivator, then use a one-horse plow for two years, and cease cropping when bearing begins heavily, and plant nothing. Windbreaks are essential; would make them of one row of Osage orange, on the west side of orchard. For rabbits I use tree paint and wood veneers. I prune my trees in the winter, to produce health and give good form; think it beneficial, and that it pays. I do not thin my fruit while on the trees, but think it would pay. I fertilize my orchard with stable litter; think it beneficial; would advise its use on sandy land. My trees are troubled with flathead borer, and my fruit with codling-moth and curculio. I do not spray. I pick my apples from ladders; pile those taken from eight trees together and cover with hay. Sort into three classes: First, sound and large; second, sound and small; third, spotted. I sell apples in the orchard, also wholesale and retail; pack my best in bushel boxes and sell to grocers. Sell my second and third grades to peddlers and farmers from the west. My best market is at home. Have tried distant markets and found they paid. Am successful in storing apples in bulk in a bank cellar, Winesap and Missouri Pippin keeping the best. Do not irrigate. Good apples sold here this winter for one dollar per bushel. I employ farm hands at farm wages.

C. H. LONGSTRETH, Lakin, Kearny county: Have lived in Kansas twenty-nine years. I have 3400 apple trees—500 eleven years old, 1200 eight years old, 700 six years old, and 1000 set this spring. For market I prefer Ben Davis, Missouri Pippin, and Winesap. For family use I would advise Early Harvest, Red June, Maiden's Blush, Chenango Strawberry, Smith's Cider, Huntsman's Favorite, Rome Beauty, Jonathan, Ben Davis, Winesap, and Missouri Pippin. Have discarded the Red Astrachan, Willow Twig, and Cooper's Early White, as they

will not bear. I prefer second bottom, not too high or too low; sandy loam, with loose clay subsoil; any slope is good, north preferred. I prefer small-sized, well rooted, two-year-old trees, planted with a spade, in deeply plowed, thoroughly prepared ground, and would cultivate until they die of old age. I use a sixteen-inch disc, Acme harrow, Thomas's smoothing harrow, and Barnes's weeder. I grow small fruit and vegetables among the trees until of bearing age. Would plant windbreaks of six or eight rows of North Carolina poplars, honey and black locust, Russian mulberry, white ash, and box-elder, one-year seedlings, two feet apart, in rows four feet apart, on the north and south side of orchard. For rabbits, I wrap my trees as soon as possible after planting. I prune with a knife to admit sun and air, and to keep down suckers and limbs that rub each other. I thin all through the season, taking out imperfect fruit as far as possible, and it pays. I do not think it necessary to mix varieties to insure fruitfulness, yet this spring I planted 1000 Missouri Pippins, filling every sixth row with Winesaps for a test. The varieties I have discarded as not bearing were thoroughly mixed in with other kinds. I would use no fertilizers unless on very thin soil, and then would prefer to use before planting. I use fertilizers after the trees come into bearing, but up to bearing age good, thorough cultivation in the early part of the season is all that I would give. I do not pasture orchards; it might be advisable to turn hogs in to eat up windfalls affected with codling-moth, but never any other stock.

Am troubled only with root aphid, codling-moth, and curculio. I spray right after the blossoms fall with London purple, for codling-moth, and have reduced them to a great extent. Have prevented borers by wrapping. I contemplate using kerosene emulsion on curculio and insects that I cannot reach with poison. I pick in canvas lined half-bushel baskets, and sort into firsts, seconds, and culls, carefully, by hand. I pack in boxes, if I can get them; have used barrels well shaken and pressed down, marked with stencil, and shipped by rail. Denver has been our best market thus far; sometimes I have sold most of my apples in the orchard; never have to peddle any. I feed the culls to my hogs. Never dry any, but think I will try it in the near future, as there is a good home market for a large part of them. Have stored a good many in cellar in barrels and in bulk; some I have buried. I do not like either plan, and am figuring to put up some kind of cold-storage building for future use. Winesap, Missouri Pippin, and Ben Davis, in the order named, have kept best for me, my losses being about one-fifth. I irrigate by flooding the ground all over thoroughly when necessary. Prices have ranged from 75 cents to \$1.25 per bushel; from \$2.50 to \$3 per barrel. I use the best men I can get, and pay \$1 a day and board, or \$1.50 per day without board.

A. W. SWITZER, Hutchinson, Reno county: Have lived in Kansas twenty-six years; have 2000 apple trees twelve, fifteen and eighteen years old. Winesap, Missouri Pippin and Ben Davis for market purposes; Maiden's Blush, Rambo and Roman Stem added for family use. Have discarded Limber Twig and Willow Twig, both subject to blight. I prefer bottom land, sandy loam soil, and sandy subsoil; north slope is best. Plant two-year-old, low-headed trees, in holes large enough to receive all the roots without crowding, one inch deeper than in the nursery. Plant to corn until five or six years of age; then nothing. Plow and cultivate both ways to kill the weeds. I believe windbreaks are a necessity, and should be made of trees planted two or three rods wide, four feet apart, on the south side. Wrap the trees with straw or hay to protect from rabbits and borers. I prune with a saw to thin out where too thick, and to keep down the water-sprouts; it certainly pays. I use stable litter and old hay in the orchard for fer-

tilizer. Do not think it pays or is advisable to pasture orchard. I spray when the bloom begins to fall, three times for codling-moth, with London purple and Paris green, and I am satisfied I have reduced them. For the borer I use a knife and a wire. I pick in baskets, and pile in long rows in the orchard. I sort into two classes, and sell the best in the orchard to men who haul them west. The culls go for cider. I do not irrigate, and I do not dry or store any apples. Prices have varied from twenty-five cents to one dollar per bushel. I use common farm labor at fifteen to eighteen dollars per month.

J. C. CURRAN, Curran, Harper county. I have lived in Kansas fifteen years. Have fifty apple trees eleven years old. For commercial orchard I prefer Ben Davis, Winesap, Missouri Pippin, and York Imperial, and for family orchard add some summer and fall varieties. Have tried and discarded Rawle's Janet, on account of slow growth. Bellflower is a fall apple here; and Jonathan is too small. I prefer bottom land, sandy loam, subirrigated, water at six feet. I prefer good two-year-old trees, head twenty-eight inches from the ground, planted in spring, after March winds. I cultivate my orchard all the time with a disc drawn by four horses. I plant no crop. Have some weeds and rabbits. Windbreaks are essential; would make them of mulberries planted not closer than forty feet to the first row of trees; would buy the mulberry sprouts from the nursery. I keep the rabbits down with dogs and shot-guns; dig borers out. I never thin my apples; the wind does it for me. I fertilize my orchard with barn-yard litter, but think it injurious to the trees. Do not pasture my orchard. Trees are troubled with canker-worm and tent-caterpillar, and fruit with curculio. I do not spray. Pick apples by hand. Never dry apples; it does not pay. Do not irrigate. Prices have been fifty cents per bushel in the fall, and one dollar per bushel in the winter.

JOHN H. GOSCH, Norwich, Kingman county: I have lived in Kansas twenty years. Have an apple orchard of 100 trees eighteen years old. I prefer a bottom having dark soil. I plant two-year-old trees in large holes, well watered. I cultivate my orchard shallow, and mulch, using a disc. Never plant anything among the trees. Windbreaks are essential; would make them of two or three rows of mulberries, on the north and south sides of the orchard. I fertilize my orchard with stable litter, but do not put it near the trees; think it beneficial, and would advise its use on all southwestern Kansas soil. Am not bothered with insects. Do not spray. Apples have been one dollar per bushel.

L. W. LEACH, Kingman, Kingman county: I have lived in Kansas twenty years. Have an apple orchard of about 300 trees, from fourteen to eighteen years old. Those that do the best here are Red June, Maiden's Blush, and Cooper's Early White.

H. E. JESSEPH, Danville, Harper county: I have lived in Kansas twenty-five years; have an apple orchard of 800 trees, 100 of them but one year old and the other 700 are fourteen years old. For market I prefer Missouri Pippin, Ben Davis, and Winesap, and for a family orchard Grimes's Golden Pippin, Stark, and Cooper's Early White. Have tried and discarded the Nonesuch. I prefer bottom land with a deep loam that goes to water, with a north aspect. I prefer two-year-old trees set sixteen feet apart. I plant my orchard to corn for about eight years, using a disc harrow; and cease cropping at the end of that time. Windbreaks are essential; I would make them of Osage orange, Russian mul-

berries, or cottonwood, by planting all around the orchard, making it the heaviest on the south side. For rabbits I wrap the young trees with corn-stalks, and borers I dig out. I prune with pruning-shears and a chisel to increase the fruit; I think it pays. I thin my fruit while on the trees in June and July, and find it pays. My trees are in mixed plantings. I do not fertilize my orchard, but would advise it on all soils. I do not pasture my orchard; do not think it advisable; it does not pay. My trees are troubled with flathead borer, and my fruit with codling-moth. I do not spray. I hand-pick my apples in a sack, one corner of which is tied up to the top, it has a strap eighteen inches long to put over the shoulder; spread the top of the sack and pick with both hands. Sort my apples into two classes: first and second. I pick the best first, letting the inferior ones stay on the trees; I afterwards shake these off and send to the cider mill. I sell apples in the orchard. Make cider and vinegar of the second and third grades and culls. My best market is at home in the orchard. Never tried distant markets. Do not dry any; cannot find a ready market for them and it does not pay. Am successful in storing apples for winter use in bulk, in an outside cave; find the Little Red Romanite and Missouri Pippin keep best. I do not irrigate. Prices have been from sixty to seventy-five cents per bushel. I employ careful young men at one dollar per day or twenty-five dollars per month.

SAM JONES, Springfield, Seward county: I have lived in Kansas thirteen years. Have an apple orchard of fifty trees. I am not keeping them for the fruit, but for the pleasure of the birds—to build nests and sing their sweet songs in. I cultivate my orchard all the time to keep the weeds down; plant it to vines, such as squashes, pumpkins, melons, etc. Do not pasture my orchard. I do not know of anybody that ever irrigated. In regard to "the Kansas Apple," in this part of the state, they are no good. I will say there never was ten bushels of apples grown in Seward county. I planted out two acres of apple trees ten years ago; they grew, and looked very well. I took good care of them, but they never would bear; and that is the experience of every one else. I cannot tell the cause, unless it gets too dry and hot, with hot winds. [Such things were said of the whole state of Kansas by many intelligent men thirty years ago. Mr. Jones does not tell what varieties he tried, and his remarks need not discourage any whose lot is cast in Seward county. While there are only 1034 apple trees reported in the whole county, yet the low price of trees should encourage every farmer to plant a few of the hardier varieties, if only as an experiment.—SECRETARY.]

JOSEPH BAINUM, Langdon, Reno county: I have lived in Kansas twenty-five years. Have an apple orchard of twenty trees, most of them ten years old. For market I prefer Missouri Pippin and Winesap, and for family would add Early Pennock and Maiden's Blush. Ben Davis would not do any good for me. I prefer bottom or table land with a heavy subsoil and a northern slope. I prefer two-year-old trees with low heads, set in a ditch. I cultivate my orchard to corn as long as I can get in with a plow; I also use a disc and harrow. I cease cropping when the trees need all the moisture; do not plant anything in a bearing orchard. Windbreaks are essential; would make them of mulberry trees, set thirty or forty feet away from the orchard. For rabbits I use axle grease and sulphur mixed. I prune, leaving the tops low, and thin out the branches so as to give air and produce larger fruit; it has paid me. I fertilize my orchard with stable litter but do not put it close to the trees; I think it beneficial, and would advise its use on all soils. I have pastured my orchard with cattle and hogs; do not think

it advisable; it does not pay. Trees are troubled with flathead borer and leaf-roller, and my apples with codling-moth. I have sprayed, but not lately, with London purple for codling-moth, just after the blossoms fell; it did not pay—did not reduce the codling-moth any. I go after insects not affected by spraying with a small wire. I pick my apples by hand in half-bushel baskets; sort into three classes—largest and sound, second best, and cider. I wholesale, retail, and peddle, and make the culls into cider and vinegar. Never have tried distant markets. I dry some with a Stutzman dryer; it is satisfactory. I pack them in cracker boxes and find a ready market for them at times; it does not pay. Am successful in storing apples two feet deep in bins, one above another, in a cellar walled up with rock; never tried any excepting Missouri Pippin and Winesap. I have to repack stored apples before marketing, losing about five per cent. I irrigate my orchard with water pumped into a reservoir 80x120 feet, and three feet deep. Prices have been from 50 cents to \$1.25 per bushel; dried apples, ten cents per pound. I employ women at fifty cents per day.

A. S. DRAKE, Bucklin, Ford county: Have lived in Kansas twenty years, and have 330 apple trees from three to eleven years old, part of them ten inches in diameter. I prefer good keeping apples for family use. I prefer bottom land, subirrigated, with a north and east slope. I prefer two-year-old trees, set the same depth as they grow in the nursery. I cultivate my orchard from three to eight years, in potatoes, with a plow and harrow; I plant nothing in a bearing orchard, and cease cropping when they shade the ground. Windbreaks are essential where orchards are exposed. I would make them of forest-trees. I protect from rabbits by wrapping with poultry wire. I dig borers out. I prune very little, just enough to stop top growth; I think it has been beneficial. I thin my apples when the limbs are unable to support them. I mulch only to hold back the bloom. I do not pasture my orchard. Borers trouble my trees. My apples are not troubled with insects. I pick my apples by hand, and put them carefully into a basket. I sort into two classes: first, sound and smooth; second, unsound. I do this work by hand. I pack in barrels, pressed full. My best market is at home; we eat and cook the best, and the culls I donate to the children. I never dry any. I store some in barrels, and am successful. I find those I keep from the family keep best. [?] The prevailing price has been one dollar per bushel. I employ men by the month.

FRED MOORE, Great Bend, Barton county: I have lived in Kansas twelve years. Have 200 apple trees from one to sixteen years old. For family orchard I prefer Missouri Pippin, Winesap, and Maiden's Blush. I prefer bottom land, with north slope. I cultivate every year with stirring plow and harrow; plant nothing. think windbreaks essential, made of forest-trees. I wrap my trees with rags to protect from rabbits. I prune with a saw to thin the branches. I never thin apples. I fertilize with stable litter. My trees are troubled with flathead borers. Worms trouble my apples. I do not spray. I dig borers out with a knife, in August and September. Price has been fifty cents per bushel.

W. G. OSBORNE, Medicine Lodge, Barber county: Have lived in Kansas since 1865. Have 150 apple trees, from two to fourteen years planted. I prefer root grafts, and plant in rows twenty to twenty-five feet each way. I cultivate in corn, using a plow. Keep rabbits down with hounds. I prune with a knife. I fertilize with barn-yard litter. Do not spray or irrigate.

JOSEPH LEWIS, Bluff City, Harper county: I have been in Kansas twenty-two years; have an orchard of 1000 trees; the first were set in 1881. The varieties are Missouri Pippin, Ben Davis and Winesap for market, and Duchess of Oldenburg, Maiden's Blush and English Rambo for family use. I prefer bottom land, of level, sandy loam. I plant two year-old thrifty trees in rows two rods apart. I grow nothing in the orchard, and never cease cultivating with a stirring plow, disc, and harrow. I believe windbreaks are essential in this county, and would make them of any thrifty forest-tree; Russian mulberry is good. I would put double rows around the orchard. I prune with shears and saw to thin the tops. I never use any fertilizer, and never allow stock in the orchard. Am troubled some with the flat-headed borer, which I remove with a knife. I spray with London purple just as the bloom begins to fall. I pick by hand, and sell in the orchard and otherwise; never dried any. I store for winter market in a cave in bulk, and am successful. The best keepers I find are Limber Twig, Striped Vandevere, and Ben Davis. Prices prevailing have been fifty cents per bushel; dried apples, from five to seven cents per pound.

JOHN PIMM, Enon, Barber county: I have lived in Kansas sixteen years. Have an apple orchard of 2250 trees from four to twelve years old. For commercial purposes I prefer York Imperial, Ben Davis, Mammoth Black Twig, and Nero, also Shackelford; and for family orchard Jonathan, Early Harvest, Maiden's Blush, Missouri Pippin, and Winesap. Have tried and discarded White Winter Pearmain, Red Astrachan, and Mann. I prefer bottom land with a northern slope. I prefer two-year-old trees planted in a deep dead furrow. I cultivate my orchard to corn and garden-truck; cultivate four or five times during a season, the more the better; I use a disc; believe an orchard should always be cultivated. I cease cropping after six or seven years, and plant nothing in a bearing orchard. Windbreaks are essential; would make them of two rows of mulberries. For rabbits I use wrappers of wood veneer. I prune to shape the tree and to get rid of all surplus wood, and think it beneficial. I do not thin my fruit on the trees; the insects and wind do it for me. I do not pasture my orchard. My trees are troubled with flathead borer and twig-borer, and my apples with codling-moth. I have sprayed with London purple.

L. L. LOVETTE, Toronto, Woodson county: I have lived in Kansas thirty-two years; have an apple orchard of thirty trees twelve to twenty years old. For market I prefer Missouri Pippin and Winesap, and for family use would add Early Harvest and Smith's Cider. Have tried and discarded Fall Pippin, Northern Spy, and Rambo. I prefer level prairie land well enriched, with black limestone soil and a sandy subsoil, northern aspect, to hold the trees back in the spring. I prefer large, smooth trees with good roots, planted in large holes with rotten chip manure. I cultivate my orchard to hoed crops, using a diamond plow. I plant bearing orchard to white beans, peanuts, etc., and cease cropping when well in bearing. Windbreaks are essential; I use soft maple four feet apart, in four rows around the orchard. For rabbits I wrap my trees with slough grass. I pasture my orchard with hogs, and think it advisable. My trees are troubled with tent-caterpillar and borers, and my apples with curculio. I sprayed once with Bordeaux mixture; have no faith in it; I may possibly have reduced the codling-moth a little. I now watch and burn the insects. [?] I pick my apples in a sack over the left shoulder, from a step-ladder wide at the bottom and narrow at the top. Sort into three classes: first take out all inferior for cider, then put the sound ones in the barn until late in the fall, when I sort,

keeping No. 1's for spring, No. 2's for winter, and use all the rest for cider. I sell some apples in the orchard to neighbors, and some to grocerymen. I haul my best apples to market in a spring wagon with hay under them. We use many culls and give some away. My best market is at home. I dry some for market, then put them in sacks and keep in a cool place; find a ready market for them, but it does not pay. I store apples for winter market in a pit; am successful; find Winesap, Rawle's Janet and Missouri Pippin keep best. We have to repack stored apples before marketing, losing about ten per cent. of them. I water my trees artificially. Prices have been from \$1 to \$1.50 per bushel. I employ young men at one dollar per day and board.

B. F. Cox, Fowler, Meade county: I have lived in Kansas twenty-one years; have an apple orchard of 125 trees ten years old, six to ten inches in diameter. For family orchard I prefer Early Harvest, Maiden's Blush, Ben Davis, Gennetting, and Rawle's Janet. I prefer hill land, with a northeast slope, having a clay subsoil. I prefer two-year-old trees, set at crossing of furrows run both ways. I cultivate my orchard all the time with a plow and harrow; it is too dry in this climate to let weeds grow. Do not plant any crop. Windbreaks are essential; would make them of African tamarix, set in three or four rows around the orchard. For rabbits I grease lightly in the fall and wash off in the spring. I prune my young orchard with a knife, to balance the tree properly. I think it pays. Never have thinned the fruit while on the trees. My trees are in mixed plantings. I fertilize my orchard with barn-yard litter. I think it has been beneficial, and would advise its use on all clay soils. I do not pasture my orchard. My trees are troubled with tent-caterpillar and roundhead borer, and my apples with worms. I spray when in bloom, and again after blooming, with London purple. Do not think I have reduced the codling-moth any. I pick my apples by hand, and sort into two classes—family apples and hog apples. Am successful in storing apples for winter use in boxes in a cellar. I find Ben Davis and Rawle's Janet keep best. I irrigate my orchard, using a windmill and pump with a four-inch cylinder. Prices have been from fifty cents to one dollar per bushel.

DR. JAMES MYERS, Hutchinson, Reno county: Have lived in Kansas thirty-nine years. Have about 3000 apple trees eight years old, six to eight inches in diameter; fine, large trees. For market I prefer Winesap, Missouri Pippin, and Ben Davis; for home use, Early Harvest, Northern Spy, and Maiden's Blush. Most other varieties that are a success in the East are a failure here. I am satisfied with a few of the best varieties. In this county lowland is the best. I prefer a sandy land, on a clay subsoil, and a north slope, every time. I plant two- and three-year-old, clean, thrifty trees. I mark the ground in squares of one rod and plant in every other crossing, mismatching to make the trees zigzag. I will cultivate the orchard for forty years in this county if they live so long. I would grow corn amongst them for the first three or four years; after that, nothing; the less crop the better. I believe windbreaks are essential in small orchards, but in large orchards the trees will protect each other. For windbreaks I would plant maple or mulberry, at least two rods away from the apple trees. For protection against rabbits and borers, take lime and Portland cement, equal parts, mix with sweet milk to the consistency of paint; add one tablespoonful of Paris green, and apply with a brush; it will never fail. I prune while the tree is young; then the wound does not affect them so much; it pays, and is very necessary. I have never thinned, but think it necessary, just before the apples are

half grown. I use no fertilizer whatever. I do not pasture my orchard much, but when I do it is with hogs, and I think it advisable when the fruit is wormy and falling off. I have some insects, but have never sprayed. For borers I use a knife. I pick in baskets, just as late as possible.

J. O. EMERY, Cimarron, Gray county: Have lived in Kansas twelve years; have 400 apple trees four years planted, of the following varieties: Ben Davis, Missouri Pippin, Arkansas Black, Mammoth Black Twig, Rawle's Janet, and a few Yellow Transparent. Prefer bottom land in this county; plant only fifteen feet apart each way on account of the wind. Grow no crop in the orchard, and cultivate every two weeks until the 1st of August with a five-tooth cultivator. Have a double row of locusts and Osage-orange hedge all around the orchard, and consider windbreaks a necessity. I prune out the inside branches, leaving only four or five limbs, so they will not grow scrubby, and think it beneficial. I plowed under forty loads of stable litter to the acre before planting. I would not pasture an orchard. Am troubled some with web-worm and twig-borer, and have used a spray in June and August of concentrated lye and cold water; also, some Paris green and London purple for worms. I irrigate my orchard once every two weeks, from a reservoir 70 x 140 feet, and have apple trees that made $4\frac{1}{2}$ feet of growth last year. My reservoir is supplied by two windmills running four- and six-inch pumps.

BEN. MCCULLOUGH, Ellinwood, Barton county: Have been in Kansas twenty-two years; have the biggest grove in Comanche township, Barton county, covering twenty acres, most of it in fruit of all kinds. Have 300 apple trees, planted from five to fourteen years, from eight to sixteen inches in diameter; varieties, Ben Davis, Missouri Pippin, Winesap, and Rawle's Janet. Have discarded the Nonesuch. My orchard is second bottom, black, sandy soil, and perfectly level. I planted two-year-old trees in rows both ways. I grow corn and potatoes in the orchard until the trees shade the ground pretty well, and then I grow nothing, but cultivate the ground until they get big and old enough to go without it. I believe windbreaks are essential in this country; mine is composed of three rows around the orchard, of box-elder and cottonwood. I wrap my trees while small to protect from the rabbits. Wash with lye for borers. While small I prune out the middle of the tree with knife and saw, but let the lower limbs grow to protect the trunk. I believe stable litter beneficial in an orchard, and use plenty of it. I do not believe in pasturing an orchard. I never spray. I always sell my fruit in the orchard; some wagons come forty miles for it, and pay me from fifty to seventy-five cents per bushel.

B. LEONHART, Kiowa, Barber county: Have lived in Kansas thirteen years. Have 300 apple trees, planted from nine to ten years. Am uncertain as to best varieties. Plant in low ground or a "draw"; advise any loose soil, but no clay subsoil (?); like east or northern slope. Plant fresh one-year-old trees, in "deep subsoil trenched." Have planted root grafts eighteen inches long, where they are now growing, and are the pride of my orchard. Hot sun and wind make the fruit woody and sapless. Plant no crop in orchard, but plow yearly and harrow all summer. Believe in windbreaks made of locust or anything that will grow, planted in deep subsoiled furrows on south and west of orchard. For rabbits I use, in summer, lime, grass, and cow-dung, mixed. In winter I use clay with dead rabbit pounded into it. Prune to keep limbs from rubbing, and shorten in for bearing; not sure that either pays. Plant permanent orchard, and fill be-

tween with early-bearing varieties like Missouri Pippin, Jonathan, etc. [presumably to cut out afterward]. Use no fertilizers. Never let stock run in orchard. Encourage the birds, and spray some years with London purple and Bordeaux mixture before and after leafing out. Think I have reduced codling-moth. Thrifty trees never contain borers.

J. L. LIGGITT, Belpre, Edwards county: Has resided in Kansas thirty years; has a family orchard of 125 trees, planted from three to thirteen years, and advises Early Harvest, Maiden's Blush, and Jefferis. For commerce he recommends Ben Davis and Missouri Pippin. Prefers valley land sloping east or west, with sandy soil and clay subsoil. Plants sixteen feet east and west, and thirty-two feet north and south, after a lister. Plants to corn and beans for fifteen years, lessening the number of rows as the trees grow; uses a one-horse cultivator. Thinks a windbreak a necessity, and would make of evergreens, if possible; next, of box-elder, planted four feet each way after deep listing. Uses axle grease against rabbits. Prunes sparingly for shape, and says it certainly pays. Thinks thinning should frequently be done when trees appear to be overloaded. Believes trees should be in mixed plantings to produce best. Uses barn-yard litter to fertilize, and says it will pay, if scattered over the entire surface. Believes that pasturing with hogs is advisable, and makes the trees more productive. Has never sprayed, and is seldom troubled with leaf-eating insects. Removes borers with a wire or some pointed instrument twice a year. Picks from step-ladder by hand into baskets or buckets. Makes three classes—first, perfect in form and color; second, sound but not so regular in size; third, culls. Packs in three-bushel barrels carefully by hand, marked with name of variety and quality or class. Sells any way possible. Has shipped successfully to Missouri river cities.

H. CLAY HODGSON, Little River, Rice county: Has been in the state twenty-six years. Has an orchard of 5000 trees, planted from five to twenty years. Uses Winesap, Ben Davis and Missouri Pippin for both commercial and family orchard. Has tried and discarded Willow Twig, Lawver and Smith's Cider on account of blight. Says bottom land of black loam, with clay subsoil, is preferable in this section. Plants two-year-old trees, in trenches made with plow and subsoiler. Cultivates with disc and harrow, from one to twelve years, growing corn for first five to eight years, afterward nothing. Thinks windbreaks made of several rows of Osage orange or box-elder on south side a great help. Prunes while young to make a more open head. Advises the use of manure on all orchards. Does not allow stock in the orchard. As soon as the leaves appear he sprays with London purple for canker-worms, and believes he has reduced codling-moth by it. Picks in sacks, with corners tied together and hung over the shoulder. Makes two classes, market and culls. Piles his apples as picked in the orchard, and sorts out for market from the piles, leaving the culls for cider. Sells mostly in orchard. Best market is home towns; never shipped any. Stores some in a cave, in bulk, for winter, and makes a success of it. Winesaps keep best. Sold last fall (1897) at 75 cents per bushel; during winter, at \$1 to \$1.25. Uses ordinary farm help at twenty dollars per month and board.

A. S. HUFF, Sharon, Barber county: Have lived in Kansas twenty-eight years; have an apple orchard of 130 trees ten years old. For commercial purposes I prefer Ben Davis, Large Romanite, and Missouri Pippin, and for family orchard Missouri Pippin, Little Romanite, Limber Twig, and Winesap. I prefer

level land with sand as deep as I can get it, with [natural] subirrigation. I use strong, thrifty trees, set in furrows plowed as deeply as possible, and then dug out. I cultivate my young orchard to corn with one-horse, five-tooth cultivator, as long as I can get in the orchard, and cease cropping only when they commence bearing, and plant nothing after that. Windbreaks are essential, and I would make them of Russian mulberry or box-elder, set six feet apart in rows running east and west, on the north and south sides. I protect from rabbits by wrapping with corn-stalks, and use lye for borers. I prune very little with a saw to keep out watersprouts, hardly enough to pay here in Kansas. Do not thin the fruit on my trees; it thins itself. I do not need to fertilize; would advise it on clay soil. I never pasture my orchard; do not think it advisable, unless you wish to destroy your trees. My trees are troubled with flathead borer, and my apples with curculio. Never have sprayed; insects not affected by spraying I gouge out with a wire, and apply concentrated lye in April and August. I pick my apples from ladders set up around the trees, one with four legs made solid, with steps on one side and a broad board on top to set baskets on. I sort into four classes, keeping those of a uniform size separate from the small ones. I keep my apples in an apple house. I generally sell in the orchard; always get \$1.50 for my best, packed in boxes and sold at the nearest towns, at retail. I make cider for vinegar of the culls. My best market is at home; never tried distant-markets. Never dry any; it does not pay. I store all I do not sell in orchard, in a cellar 12x16 feet, six feet in the ground, with earth on top; they do not freeze. I find the Winesap, Limber Twig and Little Romanite keep best. We do not have to repack stored apples before marketing; only lose about one per cent. I do not irrigate. Prices have been \$1.25 per bushel. I hire no help; my own family does the work.

E. F. REEVE, Greensburg, Kiowa county: I have lived in Kansas twenty years; I prefer Missouri Pippins for a commercial orchard. I like a sandy bottom with a north slope. I prefer two- or three-year-old trees having bright bark; plant them by throwing out a deep furrow, and then making large holes in the furrow. I cultivate my orchard with a one-horse cultivator, planting no crop, and keep the orchard clean, never stopping cultivation. Windbreaks are essential; I would make them of Russian mulberry or Osage orange, on the north, west and south sides of the orchard, especially on the south. I do not prune my trees, nor thin my apples. I do not fertilize my orchard, and would not advise it in this section. I do not pasture my orchard. My trees are troubled with tent-caterpillar. Have not sprayed. Sort my apples into one class, cut out the rot, and make into apple dumplings [?]. Never sell apples in the orchard; keep them all for home use; my best market is at home. I do not dry any for market; they sometimes dry on the trees, the effect of hot winds. This is not very satisfactory, and does not pay. I do not store any for market. I do not irrigate. Prices have been from seventy-five cents to one dollar per bushel; dried apples, eight and one-third cents per pound.

G. W. HOLLENBACK, Coldwater, Comanche county: I have resided in the state thirty-seven years; have an apple orchard of 200 trees from six to nine years old, four to eight inches in diameter. For market I prefer Missouri Pippin, Ben Davis, and Winesap, and for family orchard Maiden's Blush, Smith's Cider, and Grimes's Golden Pippin. Have tried and discarded Rawle's Janet on account of poor quality, and Willow Twig on account of shy bearing. I prefer a northeast slope, with sandy loam and clay subsoil; bottom causes the trees to

grow too rank. I prefer two- or three-year-old trees with low, well-balanced tops, set thirty feet each way. I give my orchard thorough cultivation, on account of lack of moisture; I will continue indefinitely using a plow and corn cultivator, and plant nothing. Windbreaks are essential; I would make them of double row of peach trees on south side, to keep the trees in shape. I prune to give form; I think it pays, as they would become too dense if not pruned. I do not thin the fruit while on the trees, but think some varieties would be better if they were. My trees are planted with each variety in a separate row. I fertilize my orchard with stable litter; think it beneficial, but would not advise its use on all soils. I do not pasture my orchard. Flathead borers are in my trees, but if they are kept thrifty the borers will give little trouble. My apples are troubled with codling-moths. I do not spray. I pick my apples by hand and sell in bulk in the local market. I do not dry any. I am quite successful in storing apples in pits for winter use; the Missouri Pippin, Ben Davis and Winesap keep the best. I do not irrigate. Prices have been from \$1 to \$1.25 per bushel.

J. J. ABLARD, Lawndale, Pratt county: I have lived in Kansas twelve years. Have an apple orchard of 200 trees from three to six years old. For family orchard I prefer Missouri Pippin, Nickajack, Winesap, and Maiden's Blush. I prefer second bottom, sandy loam, with clay subsoil, and an eastern or northern slope. I prefer two-year-old trees, four feet high, branched low, planted 24x24 feet, in a furrow plowed very deeply, north and south. I plant my orchard to corn, using a cultivator, plow, and cutaway harrow, and cease cropping when the trees need all the support. Windbreaks are a benefit; I would make them of white or green ash and mulberry, by planting and cultivating three or four rows on the south and west. For rabbits I wrap the trees with rags, long straw, or grass. I prune just enough to balance the head; I think it pays and that it is beneficial. My trees are in mixed plantings. I do not fertilize, and would not advise its use. I do not pasture my orchard. My trees are troubled with flat-head borer and grasshoppers, and my apples with codling-moth. I do not spray, and I dig the borers out. I do not dry any.

D. E. BRADSTREET, Dighton, Lane county: I have lived in Kansas nineteen years; have an apple orchard of 200 trees; my oldest are nine years. I think Jonathan a good family apple; I have not discarded any. I prefer bottom with a loam, porous subsoil, and a southern slope. I prefer two-year-old whole-root trees, set twenty feet east and west and thirty feet north and south. I cultivate my orchard to garden vegetables, such as cabbage, tomatoes, etc., using a one-horse cultivator; have not ceased cropping yet. Windbreaks are essential, and I would make them of two rows of locusts, close together, all around, excepting on the east side of the orchard. I prune with a saw to thin the top; I think it has paid. I never thin fruit on the trees. My trees are in mixed plantings, and think it best. I fertilize my orchard with stable litter; it is beneficial in keeping the weeds down, but would not advise its use on all soils. I do not pasture my orchard. I do not spray. I never dry any apples. Never store any. Do not irrigate. Prices have been one dollar per bushel. Do not hire any help; myself and boys do the work.

C. L. GUNN, Heizer, Barton county: I have lived in Kansas twenty-one years. Have an apple orchard of 110 trees, from ten to twenty-five years old; the largest ones are fifteen inches in diameter. For market I prefer Missouri Pippin, Maid-

en's Blush, and Duchess of Oldenburg, and for family orchard Early Harvest and White Winter Pearmain. I prefer creek bottom with a loose and porous soil and subsoil. Young trees should not be headed too low, as the lower limbs will lay on the ground when the tree gets older and begins to bear. I cultivate my trees until too large, using a disc harrow. I do not plant any crop; do not think it advisable in this dry climate. Windbreaks are essential; would make them of forest-trees, on the north and south. I prune my trees, but have not had enough experience to tell whether it is beneficial or not. I thin my fruit while on the trees to prevent the limbs from breaking. I do not fertilize; it is not needed here. I do not pasture my orchard; it is not advisable. My apples are troubled with codling-moth and curculio. I spray with London purple about the time the blossoms fall. I do not dry any apples nor irrigate. Price has been seventy-five cents per bushel.

JOHN SIMON, Garden City, Finney county: I have lived in the state eighteen years; have an apple orchard of 150 trees, from two to fifteen years old. For market I prefer Ben Davis, Missouri Pippin, and Winesap; and for family orchard Early Harvest, Jonathan, Missouri Pippin, and Winesap. Have tried and discarded Russet and Willow Twig. I prefer second bottom, sandy soil, with clay subsoil. I prefer one- or two-year-old trees, set twenty-five to forty feet apart. I plant my orchard to garden-truck, using a disc harrow, and cease cropping when they begin to bear. I plant nothing in a bearing orchard, but keep up the cultivation to keep the ground clean and loose. Windbreaks are essential; would make them of cottonwood, box-elder, and Osage orange, putting a belt of timber around the orchard. For rabbits I wrap with corn-stalks in the fall. I prune with knife and shears to keep the tree in shape; I think it pays. I never have thinned the fruit while on the tree, but think it would pay on some varieties. I fertilize my orchard with stable litter while I am cropping the ground; but would not advise its use unless you have plenty of water. I do not pasture my orchard; it is not advisable, and does not pay. My trees are troubled with twig-borer, canker-worm, and leaf-roller, and my fruit with codling-moth. I spray when the bloom falls, and ten days later, with London purple, for codling-moth; and I think I have reduced them. Borers do not trouble my trees when they have plenty of water. I hand-pick my apples; sort into three classes—first, second, and refuse. I sell some apples in the orchard, but retail most of them to the stores; make cider of the third grade and culls. My best market is at home. I do not dry any. I am successful in storing apples in bulk in a cellar; find the Missouri Pippin, Winesap and Arkansas Black keep best. I irrigate thoroughly in the winter, early spring, and again before the fruit begins to ripen. Prices have been from fifty cents to one dollar per bushel.

DR. G. BOHRER, Chase, Rice county: I have lived in Kansas twenty-five years. Have an apple orchard of 700 trees from nineteen to twenty-two years old. For commercial orchard I prefer Ben Davis, and for family use I add Smith's Cider, Wagener, and White Pippin. Have tried and discarded Missouri Pippin and Winesap; they require more moisture than the others mentioned above. I prefer a bottom, with black loam and a porous subsoil; an eastern slope. I prefer well-grown one-year-old trees, set thirty-four feet east and west, and twenty feet north and south. I plant my orchard to corn for ten years, using a plow and harrow; think a disc would be as good. I cease cropping after ten years, and plant nothing in a bearing orchard. Windbreaks are essential on the south and west sides of the orchard, and I would make them of Osage orange

or box-elder, planted ten feet apart. For rabbits I wrap the trees with slough grass until six years old. I prune lightly, taking out the limbs which rub each other and balancing the trees. I think it pays. I do not thin the apples while on the tree. I do not fertilize my orchard; it is not needed in this locality. I pasture my orchard with horses and pigs, and think it advisable. I find it does not injure the trees. My apples are troubled with codling-moth. I do not spray. I pick by hand for storing, and sort into two classes, the good and the bad ones; the bad I make cider of and feed to hogs. I generally sell my best apples in the orchard on the trees, or any way I can. We sun-dry some apples, and find a ready market for them. It pays. I am fairly successful in keeping apples in bulk in a cave, and find Ben Davis and Rawle's Janet keep best. I irrigate a few trees. Prices have been from twenty cents to one dollar per bushel, and dried apples six to seven cents per pound.

J. T. EVERHART, Pratt, Pratt county: I have lived in the state twenty years. For a family orchard I prefer Missouri Pippin, on sandy bottom land, with a north slope. I plant two-year-old trees, deeply. I plant my orchard to potatoes for five years, using a plow. Plant nothing in a bearing orchard. Windbreaks are essential; would make them of rows of Russian mulberries planted every six feet. I prune only to keep the tree in shape. I do not thin the fruit while on the trees. Cannot see any difference whether the trees are in blocks of a kind or in mixed plantings. I do not fertilize; would not advise its use on the soil here. I pasture my orchard with hogs; think it advisable, and that it pays. My trees are troubled with borers and sun-scald. I spray my trees when in bloom, and after it has fallen, with London purple only. My best market is at home; never have tried distant markets. I irrigate my trees on the upland four or five months. Prices have been from 75 cents to \$1.50 per bushel.

JAMES CRAIG, Garden City, Finney county: Have been in Kansas nineteen years. Have an orchard of 1300 trees, planted twelve years, trees running from twelve to eighteen feet high. Cultivate up to this time with twenty-inch disc harrow, and grow no crop. Windbreaks are essential in this county. I would not allow stock in my orchard. I dig out the borers, and intend to try spraying this year. I pick by hand, and sell largely in the orchard. My best market is Garden City. I make cider and vinegar of the culls. I have never dried any. I store in bulk for winter, and am successful in keeping the Missouri Pippin, Winesap, and Ben Davis. I irrigate by flooding. The average price has been about sixty cents per bushel.

JOHN BAILEY, Harper, Harper county: I have resided in Kansas twenty years. Have an apple orchard of 400 trees, set sixteen years, eight to twelve inches in diameter. For all purposes I prefer Missouri Pippin, Winesap, and Jonathan. Have tried and discarded Rawle's Janet, because the fruit cracks open, Snow, because they are poor, and White Winter Pearmain, because the tree is subject to disease. I prefer good, sandy soil, with a northeast slope. I prefer healthy two-year-old trees, with good roots, planted twenty-eight feet apart each way. I cultivate my orchard every year with a cultivator and harrow, to keep the ground loose and mellow, and plant nothing. Windbreaks are not essential. For rabbits I wash the tree with weak lye and sulphur; have found no remedy for borers, excepting to keep the trees healthy and growing. I prune, to let in sun and keep the limbs from rubbing; I think it pays, and that it has been beneficial. I thin my fruit by pulling it off when small; I think it pays; it keeps the trees from

breaking. I fertilize my orchard with stable litter; I think it beneficial, and would advise its use on all soils. I do not pasture my orchard; I do not think it advisable. My trees are troubled with canker-worm, tent-caterpillar, woolly aphis, and twig-borer, and my apples with codling-moth and curculio. I spray after the blossoms fall, and once a week for three or four weeks after that, with London purple, for all insects. I dig borers out with a fine wire. I sort my apples into three classes—first, second, and cider. I sell my apples in the orchard, wholesale, retail, and peddle. Sell the best ones in barrels. Make cider and vinegar of the culls. My best markets are at home and Oklahoma territory. I do not dry any. I am successful in storing apples in bulk; find the Missouri Pippin keeps best. I do not irrigate. Prices have been from twenty-five cents to one dollar per bushel.

JACOB REDIGER, Maherville, Barton county: I have lived in Kansas twelve years. Have an apple orchard of 200 trees eighteen years old. I prefer sandy bottom land near the river, with a north slope. I cultivate my orchard all the time with a disc and harrow, planting no crop. Windbreaks are not essential. I prune with a saw and knife, and think it pays. Never have thinned my apples, but if it were necessary would do it before they begin to hang down. My trees are in mixed plantings. I mulch my orchard with stable litter and straw; would not advise its use on all soils. I do not pasture my orchard, but think it would be advisable, as they would eat insects. My trees are troubled with flat-head borer, and my apples with curculio. The first of June I dig the borers out with a penknife and cut their heads off. I pick my apples by hand. I sell apples in the orchard at retail; feed the culls to hogs. My best market is among the neighbors. I store apples for my own use by burying, and find the Missouri Pippin, Ben Davis and Romanite keep best. I do not irrigate, but ought to. Prices have been from fifty cents to one dollar per bushel at picking time.

N. MAYRATH, Dodge, Ford county: I have lived in Kansas twenty years. Have 250 apple trees eight to twelve years old, six to ten inches in diameter. I prefer upland for fruit, a sandy loam, with a northern aspect. I prefer two-year-old grafts, planted thirty by thirty feet east and west. Have tried root grafts with success. I cultivate my orchard to garden-truck and hoed crops, using plow in spring, then the disc or Acme harrow. I keep the ground clear of weeds and mellow up to the middle of July. I cease cropping after four or five years, planting nothing in a bearing orchard. Windbreaks are essential here in western Kansas, and I would make them of Russian mulberry, in one or more rows, north and south of the orchard.

M. M. WILSON, Zionville, Grant county: I have resided in Kansas fourteen years; have an apple orchard of 300 trees ten years old, four to six inches in diameter. I prefer sandy bottom land.

THOMAS E. HOCKETT, Hugoton, Stevens county: I have lived in the state thirteen years; have an apple orchard of sixty trees eight years old, eight to twelve feet high. I prefer dark, sandy loam. I dig large holes, set one-year-old trees, putting top soil around the roots. I cultivate my orchard with a stirring plow and hoe, and plant nothing; am still cultivating. Windbreaks are essential. I would make them of two or three rows of mulberry trees. For protection from rabbits I rub dead rabbit on the tree, and repeat if necessary when we have much rain. I prune very little. Do not thin the fruit while on the trees.

My trees are planted in blocks. I fertilize my orchard with stable litter; think it beneficial, and would advise its use on all soils. I do not pasture my orchard. I do not spray; am not troubled with insects. I hand-pick my apples. I do not dry or store any for market. I do not irrigate.

GEO. T. ELLIOTT, Great Bend, Barton county: I have lived in Kansas twenty-one years. Have an apple orchard of 800 trees from two to ten years old, and three to seven inches in diameter. For market I prefer Missouri Pippin, Ben Davis, and Jonathan. I prefer a sandy bottom, with a northeast aspect. I prefer three-year-old trees set twenty feet apart, in land which has been plowed deeply and subsoiled. I cultivate my orchard as long as I can get among the trees, with a disc that throws dirt out first, and one that throws dirt in second. I cease cropping after the first year; plant nothing in a bearing orchard. I have a windbreak made of black locust and mulberries. I prune with pruning-knife and shears to form the tops. I think it pays. I do not thin my apples while on the trees. I believe all orchards should be set in mixed plantings. I fertilize my orchard with stable litter, and think it beneficial on sandy soil. I do not pasture my orchard; do not think it advisable; it does not pay. My trees are troubled with flathead borers and tent-caterpillars, and my apples with curculio. I do not spray. I hand-pick my apples. I do not irrigate; but think a windmill and a good pond would pay.

J. B. SCHLICHTER, Sterling, Rice county: I have lived in Kansas since 1871. For market I prefer Missouri Pippin, Winesap, Willow Twig, and Rawle's Janet, and for a family orchard Maiden's Blush and Early Harvest. I have tried and discarded Ben Davis because they died when eighteen or twenty years old; they are no good here. I prefer a northeast slope, with a sandy loam and a clay subsoil. I prefer small two-year-old trees, set 16x24 feet, rows running north and south. I plant my orchard to corn up to bearing age, using the plow and harrow, and plant nothing after they begin to bear, but keep up the cultivation. Windbreaks are essential; I would make them of two or three rows of Russian mulberries, on the south side of the orchard. I do not prune my trees; it does not pay. I do not thin the fruit while on the trees. My trees are in mixed plantings. I do not fertilize my orchard. I do not pasture my orchard; it is not advisable. I do not spray. I pick my apples by hand, the old way; sort into two classes. I dry some.

FRUIT DISTRICT No. 4.

Following is the fourth district, composed of twenty-four counties in south-east quarter of the state. Reports, or rather experiences, from each of these counties will be found immediately following. We give below the number of apple trees in the fourth district, as compiled from the statistics of 1897. Many thousands were added in the spring of 1898.

	<i>Bearing.</i>	<i>Not bearing.</i>	<i>Total.</i>
Allen.....	122,015	64,449	186,464
Anderson.....	111,372	46,719	158,091
Bourbon.....	175,961	40,570	216,531
Butler.....	182,827	53,966	236,793
Chase.....	46,762	25,191	69,953
Chautauqua.....	96,865	22,853	119,718
Cherokee.....	238,331	92,067	330,398
Coffey.....	167,255	68,247	235,502
Cowley.....	172,648	50,767	223,415
Crawford.....	143,089	34,798	177,887
Elk.....	101,601	34,343	135,944
Greenwood.....	117,840	70,224	188,064
Harvey.....	85,471	30,613	116,084
Labette.....	257,915	83,345	341,260
Linn.....	108,654	45,285	153,939
Lyon.....	161,295	116,176	277,471
Marion.....	86,838	64,359	151,197
McPherson.....	122,538	38,498	161,036
Montgomery.....	121,282	35,572	156,854
Neosho.....	159,443	61,754	221,197
Sedgwick.....	182,363	74,742	257,105
Sumner.....	140,613	36,961	177,574
Wilson.....	139,869	47,876	187,745
Woodson.....	72,815	24,485	97,300
Total in district No. 4.....	3,315,862	1,163,660	4,479,522
Estimated acreage.....	650,000	220,000	870,000

WM. SNYDER, Towanda, Butler county: I have lived in Kansas twenty-seven years; have an orchard of 1200 trees—200 twenty-six years old, diameter twelve to fifteen inches, thirty feet high; 700 twelve years old, eight to ten inches in diameter at base, twelve to fifteen feet high; 300 eight years old, five to six inches in diameter at the ground, eight to ten feet high. For all purposes I prefer Summer Rose, Early Harvest, Duchess of Oldenburg, Grimes's Golden Pippin, Jonathan, Missouri Pippin, Winesap, and Ben Davis. Bottom land is best for Ben Davis and Winesap; other varieties named will do better on high ground. North-east slope is preferable; black loam with clay subsoil. I plant healthy three-year-old trees, branching three feet from ground, in deep furrows, crossmarked with plow; stand trees erect, and tramp earth firmly about the roots. I cultivate my orchard five years with plow and cultivator, and grow corn in young orchard. I cease after five years, and grow nothing in bearing orchard. Wind-breaks are essential; would make them of peach, Russian mulberry, or cedar, by planting several rows on south of orchard. For rabbits, fence with two-foot poultry netting; for borers, whitewash and cultivate. I prune just a little with saw or shears to remove interlocking branches only; it pays. Never have thinned

my fruit; believe it does not pay. Can distinguish no difference whether trees are in blocks of one kind or mixed plantings. I do not fertilize my orchard. Stable litter would, I think, benefit thin soil. I do not pasture my orchard; it is not advisable, and does not pay.

My apple trees are troubled with canker-worm, root aphid, and fall web-worm. Have sprayed for fifteen years, for canker-worm and codling-moth. Have used London purple and arsenate of lime. I spray for canker-worm as soon as they hatch and the buds begin to open, and again before bloom opens; for codling-moth, at time the bloom drops. I have reduced the codling-moth very much. I pick my apples by hand, from a ladder, into baskets, and sort into two classes usually; first class, for market, picked by hand; second class, for cider, shaken off. Have never used packages of any kind. Usually deliver in wagon. I sell apples in the orchard, wholesale and retail. Sell best to my neighbors, in orchard. Second and third grades I sell cheap and convert into cider and vinegar. The culls I feed to cattle and hogs. My best market is in the orchard and at Wichita; never have tried distant markets. Never dry any. Sometimes I store apples for winter market in a cellar, but prefer a cave; store in boxes and bulk. Am fairly successful; have apples in cellar at this time (May 1), Missouri Pippin, Winesap, Ben Davis, and Grimes's Golden Pippin, in the order named. Never have tried artificial cold storage; have to repack stored apples, if late, losing from ten to fifteen per cent. I do not irrigate. Prices have been from 50 cents to \$1.50 per bushel. I employ the best help I can get, and pay seventy-five cents per day and board.

R. O. GRAHAM, Altoona, Wilson county: I have lived in Kansas twenty-seven years. Have an apple orchard of forty trees from five to eight years old. For market I prefer Ben Davis, Missouri Pippin, Willow Twig, Rawle's Janet, and Grimes's Golden Pippin; and for family orchard I would add Maiden's Blush, Red Astrachan, and Red June. I have tried and discarded Belleflower, Limber Twig, and King of Tomkins County; they are no good. I prefer a clay bottom, with a north or northeast slope. I prefer two-year-old, round-top trees, with whole roots, set in dug holes, in the fall or spring, as deeply as they stood in the nursery. I cultivate my orchard five to eight years, with a hoed crop, or just keep the ground clean, and sow oats and sometimes red clover in a bearing orchard. Windbreaks are essential; I would make them of Osage orange. I prune to give shape, and to keep limbs from crossing; I think it beneficial, and that it pays. I seldom thin my fruit while on the trees; I pick them off when the size of walnuts. My trees are in mixed plantings. I fertilize my orchard with well-rotted stable litter; put it between the rows; it has proven very beneficial; I would advise it on all soils, but less of it on bottom land. I never pasture my orchard, excepting with pigs, to eat the oats or clover, which I think advisable, and that it pays.

My trees are troubled with bark-louse, twig-borer, web-worm, tent-caterpillar, and canker-worm, and my apples with codling-moth and curculio. I spray my trees while in bloom, and two or three times afterward, with London purple and some Paris green; have greatly reduced the codling-moth. For rabbits I wrap the trees with corn-stalks and tie with a string. Borers I dig out, and then with a goose-quill or a spray nozzle I blow insecticides into the hole. I pick my apples by hand into sacks or pails from a step-ladder; sort into three classes; pack very closely into two and one-half bushel barrels, and mark with variety and grade; haul to market on wagon. I have sold apples in the orchard; I dispose of them any way I can; I feed culls to the hogs. My best markets are

Kansas City, Denver, and Western points; have tried distant markets, and found it paid; but better sell at home. I do not dry many apples; it does not pay for good apples. I am fairly successful in storing apples in boxes, barrels and bulk in a cellar. I find Ben Davis, Jonathan and Rawle's Janet keep best. Never tried artificial cold storage. I have to repack stored apples before marketing, losing about ten per cent. of them. I do not irrigate. Prices have been from 75 cents to \$1.25 per bushel for winter apples. I employ men at one dollar per day.

FRED. WAHLENMAIER, Arkansas City, Cowley county: I have resided in the state thirty-five years. Have an apple orchard of five acres, twenty-four years old. I prefer Maiden's Blush for a family orchard. I prefer a sandy loam, hill-top, with a north slope. I prefer two-year-old trees, planted thirty feet apart. I plant my young orchard to corn, and plant nothing in a bearing orchard. I prune my trees, to produce better and more fruit. I do not thin the fruit while on the trees. I fertilize my orchard with stable litter. I pasture my orchard with calves. My trees are troubled with canker-worms and roundhead borers. I sprayed last year for canker-worms, with coal-oil and water, when the leaves were coming out. I wholesale my apples. Make cider of the culls. My best market is Arkansas City. We sun-dry some apples for our own use. I have stored some apples in the cellar; never have tried artificial cold storage. I do not irrigate. Prices have been from twenty-five to sixty cents per bushel.

C. R. DAVIDSON, Yates Center, Woodson county: I have lived in Kansas fifteen years; have an apple orchard with trees from five to twenty years old. For market I prefer Ben Davis, Missouri Pippin, Jonathan, Winesap, and Maiden's Blush, and for family orchard add Early Harvest. Have tried and discarded Yellow Bellflower; it will not bear. I prefer bottom land with a northern slope which has a black-loam. I prefer two- or three-year-old trees, set in rows thirty feet east and west, and sixteen feet north and south. I plant my orchard with corn four or five years, using a cultivator, and cease cropping after six or eight years; Kafir-corn does well in a bearing orchard. For rabbits I think wire screening is best. I prune my trees to let in air; think it beneficial, and that it pays. Do not thin the fruit while on the trees. I fertilize my orchard with stable litter; it strengthens and invigorates the trees; would advise its use on all soils unless very rich. I pasture my orchard with calves, because they do not hurt the trees; I think it advisable, and that it pays. My trees are troubled with web-worm, and my apples with curculio. I spray with London purple, one tablespoonful to two gallons of water, to destroy the curculio. I think I have reduced the codling-moth. For borers I use ashes; throw them around the tree, or make a lye of them, and wash the tree and throw some around the roots. I pick my apples from a ladder into baskets.

G. K. AYERS, Furley, Sedgwick county: I have lived in the state twenty-seven years. Have an apple orchard of 300 trees, twenty-one years planted, eight to fourteen inches in diameter. For commercial orchard I prefer Ben Davis, Jonathan, Rome Beauty, and Winesap, and for family orchard Sweet June, Duchess of Oldenburg, Maiden's Blush, Baldwin, Grimes's Golden Pippin, Jonathan, Rome Beauty, and Winesap. Have tried and discarded Red Astrachan and Rambo for unproductiveness; White Winter Pearmain as unproductive, short-lived, and a poor seller. I prefer for an apple orchard the best corn land, in a bottom. I prefer two-year-old trees, with good roots not mangled, set in squares thirty feet each way. I cultivate my orchard to corn or vines, using a

plow, harrow and cultivator eight or ten years in the orchard, and cease cropping after ten years. I plant a bearing orchard to orchard-grass and timothy (blue-grass is injurious). Windbreaks would be an advantage on the south and west; would make them of live trees; plant Osage orange next to orchard and forest-trees outside of it. For rabbits I wrap the young trees; also shoot and trap them, especially the jacks.

I prune very cautiously, and mostly on the north side, using a saw and knife, to give symmetry and keep limbs from crowding; I think it beneficial. I fertilize portions of my orchard with stable litter; would not advise it on all soils, as I think an orchard can be overstimulated. I have pastured the orchard with calves and hogs, but do not now; it does not pay; do not think it advisable. My trees are troubled with canker-worm, flathead borer, and fall web-worm, and my apples with codling-moth and curculio. I spray April 15 and May 10, on later date, with London purple, for insects. Think I have reduced the codling-moth. For insects not affected by spraying, I keep the tree in a healthy condition. Pick my apples by hand; sort into three classes—market, cooking, and cider. I sell apples in the orchard, wholesale, retail, or peddle; sell the best apples in the orchard or to dealers; peddle the second and third grades; make cider of the culls. I find the nearest markets to be the best; never have tried distant markets. Do not dry any. Do not store any, but think I shall. Do not irrigate, but would if I had the water. Prices have been fifty cents to one dollar per bushel for best winter apples.

H. A. CONDRA, Longton, Elk county: I have resided in Kansas twenty-one years; have an apple orchard of seventy-five trees, twenty years old, ten to sixteen inches in diameter, twenty to twenty-five feet high. I have thirty more which are but two years old. For market I prefer Ben Davis, Winesap, Jonathan, and Missouri Pippin; and for family orchard Red Astrachan, Maiden's Blush, Rawle's Janet, Missouri Pippin, and Winesap. I prefer a bottom which has a rich loam, with a gravel subsoil and a north or east slope. I prefer two-year-old trees having but two limbs, both starting from the same place, set in holes four to six feet in diameter, two feet deep, filled in with good dirt. I cultivate my orchard to corn—so as to keep weeds down and hold moisture—use a disc harrow and cultivator so as to keep the soil loose and fine two or three inches down. I cease cropping after eight or ten years, and plant nothing in a bearing orchard. Windbreaks are not essential. For rabbits I use tin from the roofs of burned buildings or building paper. I prune with a saw and an ax to thin the tops and keep the limbs above my head; think it pays. I do not thin the fruit while on the trees. My trees are planted in blocks [of same kind]. I fertilize my orchard with any well-rotted manure; I think it beneficial, and would advise its use on all soils, especially on old orchards. I do not pasture my orchard; do not think it advisable; it does not pay.

My trees are troubled with canker-worm, tent-caterpillar, leaf-roller, and leaf-crumpler, and my apples with codling-moth. I spray when the leaves first come out, when in blossom, and once or twice afterwards, ten days apart, with London purple and Bordeaux mixture for codling-moth and leaf-eating worms. Think I have reduced the codling-moth some. I stand on a step ladder and pick my apples by hand in a small basket, then pour them into a wagon. I sort into three classes—sound, blemished, and rotten. Sound ones are put in crates, blemished are made into cider, and the rotten ones go to the hogs. I pack in crates, for convenience, and then store in the cellar. They are made of lath and 1x12 boxing lumber. The lath are sawed across in the middle, the lumber into lengths of

fourteen inches. The bottom and sides are lath one-half inch apart. This makes an airy crate, easy to handle, two feet long, fourteen inches wide and twelve inches deep, which when rounded up will hold one and one-half bushels of apples. I sell apples in the orchard; also retail and peddle. My best apples are usually sold in the orchard. Of the second and third grades we make cider, apple-butter, and vinegar. The hogs get the culls. My best market is at home. I do not dry; cannot find a ready market, and it does not pay.

I am successful in storing apples in crates in a cellar which has a wareroom overhead; the walls are of sandstone two feet thick, with six inches of dry sand between the ceiling of the cellar and the floor of the wareroom. A door is in the south end, and a window in the north, with screens so the outside shutter is open all the time except at noonday sun, and when raining or freezing. There is an air-shaft through ceiling to roof. The racks or shelves are made of 1x4 lumber, and there is one inch of space between the crates when slipped in, thus allowing the air to circulate around them. I have apples in the cellar now (April 25) while my neighbors who stored in bulk have none fit to eat; all are rotten. I find Rawle's Janet and Winesap keep best. I have to repack stored apples before marketing, losing about one-tenth of them. I do not irrigate. Prices have averaged thirty-five cents per bushel. Dried apples have been four cents for sun-dried and eight cents for evaporated.

T. H. GUEST, Grafton, Chautauqua county: I have lived in this county twenty years. Have an apple orchard of 3000 trees ten years old. For market I prefer Ben Davis, Missouri Pippin, White Winter Pearmain, and Little Romanite; and for family orchard Red June, Ben Davis, Missouri Pippin, Jonathan, Early Harvest, and Grimes's Golden Pippin. Have tried and discarded Bellflower and Willow Twig on account of blight. I prefer bottom land, with a black, sandy loam, clay subsoil, and northerly aspect. I prefer one-year-old trees—switches—planted with a lister. I cultivate my orchard to corn eight years, then use a disc harrow, running both ways, keeping a dust mulch; I cease cropping at bearing age and plant nothing. Never put alfalfa in an orchard. Windbreaks are not essential here. For rabbits I use lath and woven wire, and concentrated lye for borers. I prune with a saw and shears, to increase the size and color of the fruit; I think it beneficial, and that it pays. I never thin the fruit while on the trees, but believe it would pay. My trees are in mixed plantings; I have Gilpin or Little Romanite growing beside Missouri Pippins; they blossom the same time. At picking time in the fall I have noticed a very marked difference in the Gilpin, it having the peculiarities of the Missouri Pippin: the increase in size, with the white specks and oblong shape peculiar to the Missouri Pippin. I also noticed a difference in the Romanite for two rows in; I tried keeping some of them until spring; some were quite mellow, and the flavor was much superior to that of the Romanites not near the Missouri Pippins. I fertilize my orchard with stable litter, but would not advise its use on heavy soils. Do not pasture my orchard; it is not advisable, and does not pay. My trees are troubled with canker-worm, tent-caterpillar, root aphid, flathead borer, fall web-worm, and leaf-roller; and my apples with codling-moth, curculio, and gouger. I spray successfully when the fruit buds appear in the spring, with Paris green, London purple and Bordeaux mixture for canker-worm, tent-caterpillar, and curculio. I hand-pick my apples in sacks and baskets from step-ladders, and sort into two classes—first and second—as we pick them; put them into two different vessels, and let the culls drop. I pack my apples in two-bushel packages, with blossom end down, mark with the grower's and consignee's names, and haul to market on a heavy truck.

I sell some apples in the orchard to buyers from the territory. I make cider and vinegar of the culls, but do not dry, store nor irrigate any. Prices have been from twenty-five cents to one dollar per bushel.

G. W. RHODES, Lowe, Chautauqua county: I have lived in Kansas twenty-two years. Have an orchard of 500 apple trees from five to twenty years old. For market I prefer Ben Davis and Jonathan, and for family orchard Ben Davis, Ortley, Maiden's Blush, and Grimes's Golden Pippin. Have tried and discarded Lawver, King and Baldwin on account of shy bearing. I prefer hilltop, with deep loam, limestone soil, and clay subsoil, with northeast slope. I prefer straight one-year-old trees, with plenty of roots, set in squares of twenty-five feet. I cultivate my orchard to corn or potatoes while the trees are small, using a plow and cultivator, and cease cropping after ten years; plant nothing in a bearing orchard. Windbreaks are not essential, but would be beneficial; would make them of evergreens. For borers I wash the trunks of small trees with carbolic acid and strong soap-suds. I prune to thin the tops, so I can get in to gather the apples; it pays. I have thinned the fruit while on the trees, but not lately; have n't time; but think it pays. My trees are planted in rows, each variety by itself. I fertilize my orchard with barn-yard litter while I am cultivating; when the trees get larger I mow the grass and weeds and let lay as a mulch, and afterwards as a manure; this is all needed. Never have pastured the orchard, but think hogs with rings in their noses would be a benefit. My apples are troubled with codling-moth. I spray after the blossom falls with arsenates, for all kinds of insects that come early, especially the codling-moth; think I have reduced them. I pick my apples by hand from a ladder, bench, or get into the tree. We sort into two grades, large and small; sell them in the orchard to people from the west and Oklahoma, who haul them off in wagons. We have a great many dried apples, dried by the neighbors on shares; we find a ready market for them. I am quite successful in storing apples in bulk in a cave arched over with stone. Ben Davis, Winesap and Missouri Pippin keep best. Prices have been from twenty-five to sixty cents per bushel in the fall, and from \$1 to \$1.50 in the winter.

JASON HELMICK, Cloverdale, Chautauqua county: Has lived in Kansas twenty-seven years. For all commercial purposes he prefers Missouri Pippin and Winesap, and adds a few summer and fall varieties for family use. Has tried and discarded Bellflower, because the fruit drops off, and Ben Davis, because it cannot stand heat and drought—the trees decay early. He prefers north or northeast slope, bottom land, with a deep, porous soil, the more porous the better. He pastures his orchard with horses, cattle, and hogs, and thinks it advisable if done with care; it pays. His trees are troubled with tent-caterpillar, flat-headed borer, and leaf-roller, which do little damage. His greatest drawback is drought and heat. He does not spray, and cuts borers out in August or earlier, and kills the caterpillars. Picks his apples by hand. Never sells them in the orchard; raises mostly for home use. Stores some in boxes in a cellar. Does not irrigate. Marketable apples usually sell for twenty-five cents per bushel.

J. W. GOODELL, Sedan, Chautauqua county: Have lived in Kansas fifteen years; have an orchard of 200 trees, which are nine years old. For a commercial orchard I would plant Ben Davis, Winesap, and Missouri Pippin; and for a family orchard would add Early Harvest. Have tried and discarded Lowell and Yellow Bellflower as too tender for the climate. I prefer bottom land having a

black, sandy loam, and a northern slope, and plant one-year-old trees, thirty by thirty feet. I cultivate with a disc, and am still cultivating, growing corn in the orchard for nine or ten years. Windbreaks are essential. I would make them of natural oak if possible. For borers and rabbits I use concentrated lye and lath jackets. I prune my trees with a saw and shears, and think it pays and is beneficial. I never thin apples while on the trees, and have never fertilized. Do not pasture my orchard. My trees are troubled with canker-worm, tent-caterpillar, root aphids, fall web-worm, and leaf-roller, and my apples with codling-moth and gouger. I spray for canker-worm and all other insects before and after the foliage appears, and think I have reduced the codling-moth. I dig the borers out with a wire and wash the tree with lye. Pick my apples into baskets, and sort into firsts, seconds, and culls. I sell in the orchard, and make cider of the culls. Do not dry any. I store some for winter market in a cave. Do not irrigate. Prices have been from forty cents to one dollar per bushel.

A. D. CHAMBERS, Hartford, Lyon county: Have been in Kansas thirty-two years. Have 3500 apple trees; 1500 of them have been planted twenty-five years; 2000 of them six years. I prefer for market Ben Davis, Missouri Pippin, and Winesap, and for family orchard would add Early Harvest, Red Astrachan, Maiden's Blush, and Rambo. Have discarded Yellow Bellflower because it won't bear; Milam, because it is too small; Rawle's Janet, off on color. Only a few varieties should be in a commercial orchard. I prefer bottom land; mine slopes to the north. Any soil is good, either clay or loam. I would set thrifty two-year-old trees in furrows. I have raised thousands of root grafts in the nursery, growing my own seedlings to graft on. I cultivate in corn until they begin to show fruit, then in millet twice; I have never cultivated the orchard without a crop. When the ground gets bad, break it up and put in millet to shade the ground. I have never used any windbreaks; plant my trees close, to protect each other from the wind. I use axle grease for rabbits, and have had very little trouble with borers. I prune in the early years to shape the tree; later, to remove surplus wood, and think it increases the size of the apple. I believe stable litter is beneficial; I have applied it only on heavy clay soil. I pasture my orchard to a slight extent with horses and cows. I do not gather the down apples, but let my stock gather them. I have sprayed with London purple for canker-worm and tent-caterpillar; I use a barrel and a wagon, from first of May on, and am only partially successful; I think I have reduced the codling-moth some. I pick with baskets and wagons, and pile the apples in the orchard. I sort into three classes—first, shipping; third, culls; second, between. As I sell to shippers at wholesale, I put in the first class as small ones as the contract will allow; the second class includes all that look salable, and I sell them in the home markets; I sell what culls I can, and make cider of the others. I do not ship any. My apples mostly go south. I tried shipping once, but it did not pay. I do not dry any, nor store any for winter. Have never irrigated. Prices vary from 20 cents to \$1.25 per bushel, according to variety, time of year, etc. I use men and women for picking, and pay three cents per bushel.

B. RONEY, Benedict, Wilson county; Have lived in Kansas since the fall of 1869; have 1400 apple trees, planted from six to twenty-seven years. For market I prefer Baldwin, Winesap, Missouri Pippin, Jonathan, Ben Davis; for family, Red June, Maiden's Blush, Winesap, Rawle's Janet, and Jonathan. I have discarded the Russets (the fruit is inferior), and Bellflower (the trees are not hardy). I prefer north-slope upland with deep limestone soil and clay subsoil. I plant

thrifty three-year-old, not overgrown trees with good heads, thirty feet east and west, twenty feet north and south, to protect from the wind. I set in the spring, in a rye-field or stubble ground, running out furrows and putting in with a spade. I cultivate with a small stirring plow with one horse, for the furrows next the tree. I grow corn until the trees should bear, and then change to red clover, and mow to keep the weeds down. I believe windbreaks are essential, but care should be taken not to have many soft-wood trees near the orchard to breed insects. An elevation on the south or southwest will be found beneficial. For rabbits, wrap in the winter; for borers, wash with lime in the spring. Keep out all watersprouts; thin the top of the tree, so that the sun may penetrate; balance the top; cut out the center shoot—it pays. After trees begin to bear I would fertilize with stable litter. Hogs are good in the orchard in the spring to destroy insects, but should not be allowed to root much. I spray with London purple and Paris green when in full bloom [how about bees?], and again in ten days, and give a third spray a few days after, if any insects are on the trees. We have a good home market. For winter I find that Rawle's Janet and Romanite keep the best. Prices have ranged from forty to seventy-five cents per bushel.

GEO. HILDRETH, Altamont, Labette county: Have lived in Kansas twenty-nine years; have an orchard of 1225 trees, from ten to twenty-seven years old. For commercial orchard prefer Ben Davis, Missouri Pippin and Jonathan for winter, and Early Harvest and Red June for summer; for family use I prefer Early Harvest, Maiden's Blush, Rambo, Missouri Pippin, and Jonathan. Have tried and discarded Golden Russet and many others. I prefer a porous or well-drained soil, north by northeast slope; it is too hot in bottom, and too dry on hilltop. I plant two-year-old trees in rows running north and south, trees twelve to sixteen feet apart in the row; have grown very few seedlings. I cultivate with corn while young, and rye or wheat and keep it pastured down when bearing. I plow between rows once in fore part of July. I have a tall hedge for wind-break. I prune to keep the top balanced, and do not allow it to get too thick; I think it has been beneficial. Have never thinned apples on the trees. My trees are in mixed plantings, the varieties are Missouri Pippin, Ben Davis, and others. I fertilize sometimes, I think it beneficial and would advise it on poor land. I pasture my orchard with hogs and sheep, and think it advisable; it pays. Have some insects but not in great quantity. I spray with London purple after the bloom falls off—one pound of London purple in from 50 to 100 gallons of water. Think I have reduced the number of codling-moth. In picking I use a sack swung over the shoulder, and a light ladder. I classify to suit the purchaser, doing the sorting in a cool place and usually packing the best in barrels, and sell at wholesale, often in the orchard; feed the culls to hogs; never tried distant markets. I sometimes store for winter market in barrels and keep in cave surrounded with hay; am not always successful. I find those that keep best are Little Romanite, Rawle's Janet, Ben Davis, and Missouri Pippin; never tried artificial cold-storage. Seldom have to repack stored apples before marketing; lose about one-fourth. The prevailing price this year has been fifty to seventy-five cents per bushel.

A. S. DENNISON, Columbus, Cherokee county: Have lived in Kansas thirty-one years; have an apple orchard of 200 trees, fourteen years old. I prefer for commercial purpose Ben Davis, Winesap, and Missouri Pippin; and for family use Red June and Early Harvest. I prefer bottom land, with black loam, gravel subsoil, and northeast slope. I prefer one-year-old trees, set sixteen feet

at first; thin to thirty-two feet. I cultivate my young orchard with potatoes and strawberries for ten years, then sow to clover, plowing again in two years; I never cease cropping; cultivate with plow, disc, and harrow. I wrap the trees for rabbits. I prune with a saw and knife, and think it beneficial. I never thin apples. I fertilize my orchard with stable litter, but would not advise it on all soils. I pasture my orchard with hogs and calves, and think it advisable, and that it pays. My trees are troubled with tent-caterpillar, and my apples with codling-moth. I spray for codling-moth with London purple and Paris green immediately after the blossoms fall, and again in ten days. I think I have reduced the codling-moth. I dig borers out. I pick my apples from a ladder in a basket. I sort into three classes—sound, medium, and small and unsound. I pack in barrels carefully, and haul to shipping point in spring wagon. I sell in orchard; also wholesale, retail, and peddle; market most of them at home; make vinegar of the culls. My best market is home. Never dry any. I store some for winter in barrels in cellar; am not always successful; Ben Davis keeps best. I have to repack stored apples before marketing, and lose about ten per cent. Do not irrigate. Prices have been from twenty-five cents to one dollar per bushel. I employ men at one dollar per day.

D. C. SEIBERT, Columbus, Cherokee county: Has been in Kansas twenty-two years, and has an orchard from five to twenty years old. For commercial purposes he prefers Ben Davis and Limber Twig, and for the family adds Maiden's Blush. Prefers dark soil with a low southern slope, if not wet. Prefers two-year-old trees set about thirty feet apart. Cultivates with a disc harrow until four or five years old. Grows corn for five or six years. Thinks windbreaks essential; would make them of Osage orange all around the orchard. Prunes his trees, and thinks it beneficial, and that it pays. Does not thin apples on the trees; says the wind does that for him. Fertilizes his trees while young with stable litter, and would advise it on all soils. Pastures his orchard with calves and hogs, and thinks it advisable, and that with the hogs it pays. His trees are troubled with bark-louse and leaf-roller, and his apples with codling-moth. He sprays his trees with London purple, and thinks he has reduced the codling-moth; for borers, and other insects not affected by spraying, he throws salt over the roots of the trees. Picks his apples by hand. Wholesales, retails and peddles them. His best markets are in his county; has never tried distant markets. Does not dry any. Is successful in storing apples in bulk in a cave for winter markets, the Limber Twig and Rawle's Janet keeping best; has never tried artificial cold storage. Does not irrigate. Prices have been from forty to sixty-five cents per bushel.

JOHNSON KELLER, Arkansas City, Cowley county: Have lived in Kansas for twenty-one years. Have 2000 apple trees fourteen years old. I grow for market Ben Davis, Missouri Pippin, and Smith's Cider. For family orchard I prefer Early Harvest, Maiden's Blush, Cooper's Early White, Ben Davis, and Missouri Pippin. I have discarded Gennetting, Winesap, Rambo, Red Astrachan, and many others that were worthless in this locality. I prefer second bottom, dark sandy loam, with north and east aspect. I plant two-year-old trees thirty feet apart, in holes four feet square, dug one foot too deep, and filled up with surface soil. I cultivate thoroughly as long as the orchard lives, with stirring plow and disc, and crop with corn as long as it will even make fodder, or until the trees shade the ground too much to raise anything. For small orchards I would recommend a windbreak of Osage orange set far enough apart on the south to grow

in the shape of trees. For rabbits I use nothing but corn-stalks tied around the trees. I prune in moderation to keep the trees low; much pruning will kill trees in this locality. I thin apples some on the trees, at any time after they are the size of hickory-nuts. I find the best pollinators are a good apiary of bees. I believe in using plenty of stable litter well mixed with potash, but in moderation near the trees. Nothing except hogs should be allowed in an orchard. They destroy nearly all the insects. I spray for canker-worm as soon as they begin to hatch, and believe I reduced the codling-moth fifty per cent. last spring. For borers I wash the bodies of the trees early in spring and twice in May with soft soap and lime. For picking I use a long-handled device of my own invention, and sort into two classes: No. 1, best and largest; No. 2, medium. One week after they are put in the packing-house we pack in barrels, with hay or straw between the layers. We market our best apples and sell our second and third grades at home, and make all culls into cider and vinegar. Have tried distant markets, but did not generally pay. Never dried any. We store for winter in a fruit house and cave, in barrels, and are successful. Our best keepers have been Missouri Pippin and Winesap. Our loss on winter apples runs from three to five per cent. Prices in the fall, twenty-five to forty cents; in winter, 75 cents to \$1.25 per bushel. For help we use common laborers at from seventy-five cents to one dollar per day.

WM. N. SMITH, Brownsville, Chautauqua county: I have lived in Kansas twenty-eight years. I have an apple orchard of fifty trees twenty years old and twelve inches in diameter. For commercial purposes I prefer Ben Davis, Missouri Pippin, and Winesap, and for family orchard I would add Maiden's Blush and Bellflower. I prefer bottom land, black, sandy loam, with a clay bottom and a north slope. I plant my trees thirty-six feet each way. I plant my orchard to corn and potatoes, using a disc, and plant tame grass in a bearing orchard, and cease cropping when they begin to bear. Windbreaks are essential. I would make them of Osage orange, and would surround the orchard with a fence of the same. I prune to keep the limbs from rubbing, and I think it pays. I do not thin the fruit while on the trees. My trees are in mixed plantings. I do not fertilize my orchard; am on bottom land, which does not need it, but think it would be beneficial on some soils. I pasture my orchard with hogs, but do not think it advisable; it does not pay. My trees are troubled with canker-worm, tent-caterpillar, flathead borer, roundhead borer, twig-borer, and leaf-roller. I spray with Paris green and London purple when the worms are at work on the leaves. I dig borers out. I hand-pick my apples in baskets from ladders, and sort into two classes—large and perfect in number one, small and perfect in number two; the balance for cider. I pack in barrels filled full, and mark with the grade; then haul to market in a wagon. I make the culls into cider. Coffeyville is my best market. I dry some and find a ready market for them; it pays. I am successful in storing apples in bulk in a cellar, and find Ben Davis, Missouri Pippin and Winesap keep best. Prices have been about fifty cents per bushel; dried apples, five cents per pound.

C. E. HILDRETH, secretary Altamont Horticultural Society, Altamont, Labette county: I have lived in Kansas twenty-seven years. I have an apple orchard of 15,000 trees eight years old, five inches in diameter, and prefer Ben Davis, Jonathan and Missouri Pippin for market; and for family use Early Harvest, Red June, Jonathan, Maiden's Blush, Winesap, and Missouri Pippin. I prefer gray or red soil, porous subsoil, with an eastern slope. I set first-class, two-year-old,

well-branched trees, in large furrows, deeply plowed out, twenty feet north and south, and thirty-two feet east and west. For six years I grow corn in the orchard, cultivating well; after that nothing. I plow shallow, and disc or harrow until midsummer as often as the weeds start. I cultivate as long as the trees live. To protect from rabbits I use sixteen-inch lath woven with four strands of wire. I prune, to allow only three or four main branches. I believe in fertilizer, and would use it if I had it. I think pasturing in the orchard advisable, with young cattle or hogs, and that it pays. Am troubled some with canker-worm, tent-caterpillar, and codling-moth; for these I spray with London purple, using a tank, with a pump run by a sprocket and chain, from a wagon wheel. I believe I have reduced the codling-moth by spraying. We pick in a sack over the shoulder, as used in sowing oats. I sort only into first class and culls, as emptied by the pickers on canvas-covered tables. I use eleven-peck barrels, marking the name of variety and quality. Sell only at wholesale, making cider of the culls. Have shipped to distant markets, but it did not pay. Have never dried any, but think I ought to.

J. S. HACKNEY, Walton, Harvey county: Have lived in Kansas twenty-seven years. Have an orchard of 325 apple trees twenty-four years old, eight to sixteen inches in diameter. For commercial orchard I prefer Ben Davis, Winesap, Snow, Maiden's Blush, Huntsman's Favorite, and Grimes's Golden Pippin, and would plant the same for family orchard. Have tried and discarded Winter Strawberry and Paradise Pippin for shy bearing. I prefer high land, rich subsoil, with north slope. I prefer two-year-old grafts, the more fibrous roots the better. I checked my land to corn and then dug out the hill of corn where tree was to stand. I raise my own root grafts. I cultivate my young orchard with corn, wheat, and oats, using disc and smoothing harrow. I plant a bearing orchard to clover, and cease cropping when the limbs interfere with work. I think windbreaks are essential, and would make them of rapid-growing forest-trees. To protect the trees from rabbits, I wash them with blood and liver and tie up. I prune while young to shape and balance the top, and think it beneficial. I never thin apples. I fertilize with barn-yard litter and wood ashes. I pasture my orchard with hogs and young cattle; thing it advisable, and that it pays.

My trees are troubled with tent-caterpillar; my fruit with codling-moth, curculio, and gouger. I spray for the above-named insects after the blossom has fallen and until apples are as large as quail eggs. I think I have reduced the codling-moth. For the insects not affected by spraying I wash with soap and strong lye. I spray with London purple, Paris green, and kerosene emulsion. We pick apples by hand and are careful not to bruise them. I sort into two classes; the small and defective go to the chickens. I generally retail my apples toward spring; sell second and third grades wherever I can; make cider of culls. My best markets are home and Newton. Do not dry any for market. I store 300 or 400 bushels of apples in a cellar 32x32 feet, cemented sides and bottom, with plenty of windows and doors for ventilation; am fairly successful; Ben Davis and Winesap keep best. I have to repack them before marketing. I do not irrigate. Prices have been 40 cents to \$1.75 per bushel. I employ ordinary farm hands at \$200 per year.

P. C. BOWEN, Cherryvale, Montgomery county: I have lived in Kansas eighteen years; have an apple orchard of 600 trees from six to twenty-four years old. For commercial orchard I prefer Ben Davis and Jonathan, and for family orchard would add Maiden's Blush, Lowell, and Grimes's Golden Pippin. Have tried

and discarded Missouri Pippin, Lawver, and Roxbury Russet. I prefer a first or second bottom, with a northern or western aspect, sandy loam with gravelly sub-soil. I prefer two-year-old, well-headed trees, set thirty by thirty. I have some set thirty by fifteen feet, but intend to grub every other one out when large. I plant my orchard to corn or potatoes, cultivating two or four times a year until they begin to bear, using a stirring plow, Acme harrow, and Planet jr. horse cultivator. Never cease cropping, but pasture with hogs. Sow grass and clover in a bearing orchard. Do not cut and take crop off more than twice after they begin to bear. Windbreaks are not essential, but if they were I should make them of any kind of trees or hedges, by planting on south and west sides. For rabbits I inclose the tree with wire screening. I dig the borers out. I prune trees while young, until they begin to bear, by cutting out the cross branches and water-sprouts. This will promote wood growth, if done in early spring. It is generally beneficial. I have thinned the fruit sometimes, but it does not pay. Can't see any difference whether trees are in blocks of one variety or in mixed plantings. I fertilize my orchard with lime and ashes in limited quantities. It is beneficial only on loose, loamy soil; would not advise its use on heavy clay soils. I pasture my orchard after it comes into full bearing with swine and poultry. I think it advisable and that it pays, if too many are not put in.

My trees are troubled with canker-worm, tent-caterpillar, root aphid, twig-borer, fall web-worm, and leaf-roller. I spray just after the leaves start and three times afterwards, a week or ten days apart, using London purple and lime water for the foliage and fruit-eating insects; think I have reduced the codling-moth materially. I spray early for canker-worm, and just after the blossoms drop for codling-moth and curculio. I hand-pick my apples from a step-ladder, in a sack hung over the shoulder; sort into three classes—first, smooth and not specked; second, rough and specked; third, partly rotten, for vinegar. I sort into baskets from a table which has a rim around the edge. I pack my first-grade apples in barrels pressed full, then headed, marked with a stencil, and hauled to market on a wagon. I wholesale my best apples to home buyers, and also fill orders from a distance; sell my second- and third-grade apples to home buyers, and make into sweet cider; make vinegar of culls and feed them to hogs. My best market is at home; have tried distant markets; did not pay. Do not dry any. Am fairly successful in storing apples in barrels, boxes and shallow bins in a cellar; find Rawle's Janet, Ben Davis and Jonathan keep best. Weather is too warm in the fall in this latitude to keep apples successfully. I have to repack stored apples two or three times, losing from one-third to three-fourths of them; it varies with the season and time of picking. I do not irrigate. Prices have been from twenty-five cents to one dollar per bushel. I employ the best help there is to be had, at from 75 cents to \$1.25 per day.

JOHN HART, Sedan, Chautauqua county: I have lived in Kansas twenty-seven years, and have an apple orchard of 400 trees, ten years planted. I prefer for commercial orchard Ben Davis, and for family orchard Early Harvest, Maiden's Blush, Winesap, Ben Davis, and Arkansas Black. I prefer sandy bottom land, and plant my trees in furrows. I cultivate my orchard to corn as long as it is possible to grow anything, but plant nothing in a bearing orchard. Windbreaks are beneficial. I would make them of Osage orange or wild goose plums. I prune with a saw, to thin out the centers and keep off suckers. I think it beneficial. I fertilize my orchard with barn-yard litter. I think it beneficial, and would advise its use on some lands. I do not pasture my orchard, nor would I advise it. I spray with London purple in the spring, and am successful. I sell my ap-

ples in the orchard, and do not dry any for market. Missouri Pippin keeps better than other stored apples.

JAMES MCNICOL, Lost Springs, Marion county: Have been in Kansas twenty-seven years. Have an apple orchard of 12,000 trees, set from three to ten years. Prefer Missouri Pippins alone for commercial orchard, and Early Harvest, Maiden's Blush, Missouri Pippin and Grimes's Golden Pippin for family orchard. Have discarded White Winter Pearmain as not hardy. I prefer bottom land, northern slope, with rich surface soil and porous subsoil. After plowing out deep furrows, subsoil with a lister; then select well-rooted, two-year-old trees and plant carefully. Distance apart is an important matter; if too close, the trees, no matter how well cultivated, will suffer for moisture; if too far apart, the wind will play havoc with trees and fruit. I would plant close rows running east and west, as each row would help break the wind when the trees in the row reach each other. I would plant twenty feet apart in the row, and the rows thirty feet apart, and would recommend planting a row of cherry, dwarf pear, plum or peach between the apple rows, provided they are cut out at the proper time to not allow them to rob the orchard of moisture. Cultivate often to a good old age with a disc and Acme harrow. Grow corn or Kafir-corn for five or six years, leaving a good space next the trees; not for weeds, but to be well cultivated. A silly policy is to cultivate the corn that costs less than five cents per row for seed four times, and leave the tree row that costs two dollars or more uncultivated. Do not use a stirring plow; it hills up around the trees too much. If you list your corn, go east and west one year, north and south the next year. Keep the ground well cultivated; grow nothing after five or six years, not even weeds or clover. Cultivate at right angles and diagonal. Whenever you are blessed with a good rain in summer don't wait until the weeds start, but cultivate as soon as the ground will bear it. Keep a dust mulch on by cultivation; few know the great value of a dust mulch. For a family orchard a five-tooth cultivator near the trees, and a two-horse cultivator for the middles, will do. Use the harrow often. Six days' work at the proper time will keep a five-acre orchard in good shape through the season. Some say this is not a fruit country. It is not and never will be to the one who has no time to cultivate; but to the careful cultivator there is great reward, for the very same reason. I believe it essential to have windbreaks, and advise planting three or more rows of honey-locust and Russian mulberry for windbreaks, on the south and west sides. For rabbits I use wooden tree wraps, also traps, guns, and dogs. I prune a little, to keep the top balanced. I use no fertilizers, and would never allow stock pastured in orchard. Am troubled with root aphid, leaf-crumpler, and codling-moth. I practice spraying with blue vitriol for codling-moth. I prevent borers by keeping the ground well cultivated.

MIKE GAMER, Strong City, Chase county: Have lived in Kansas since February 14, 1877. Have 180 apple trees from one to twenty years old. For commercial orchard would prefer Maiden's Blush and Ben Davis. Have tried and discarded Rambo and Pennock, because of rot. I prefer dry bottom. I prefer trees four to six feet high, planted thirty feet apart. I cultivate in corn for ten years, and seed a bearing orchard to grass. I think windbreaks are essential; would make them of Osage orange or trees, a row outside of the orchard. Am troubled with rabbits and borers. I prune, and think it beneficial. I pasture my orchard with pigs, and think it advisable. My trees are troubled with flat-head borer, and my fruit with codling-moth. I wash the trees with soap-suds for

insects. I sell my apples in the orchard; make cider of the culls. I store apples in bulk in a cellar, and find the Romanite and Missouri Pippin keep the best. Prices have been from twenty-five to sixty cents.

GEORGE SCHENCK, Le Roy, Coffey county: Have lived in Kansas eighteen years, and have 1200 apple trees from ten to thirty years old. For commercial purposes I prefer Ben Davis and Winesap. I prefer bottom land. I cultivate my orchard to corn, using a lister and other tools; I crop as long as it is possible to cultivate. Windbreaks are not essential. I think fertilization with barn-yard litter beneficial on upland orchard, but would not advise its use on rich bottom. I have pastured my old orchard with calves and hogs.

C. F. PFLAGER, Elk, Chase county: I have lived in Kansas twenty-seven years. Have 300 apple trees from one to twelve years old. For commercial orchard I prefer Ben Davis, Willow Twig, Missouri Pippin, Winesap, and Romanite; for family orchard, Maiden's Blush, Early Harvest, Yellow Transparent, and Baldwin. I have tried and discarded Sweet Gennetting, because of rot, and when ripe it is too small for market; Caswinculet, because it sun-scalds and dries up, and Early White will not stand the climate. I prefer bottom land, with sandy soil. I prefer two-year-old trees, with low top, without forks, set four inches above the graft, at an angle of thirty degrees south. Have grown some seedlings with good success. I cultivate my orchard with potatoes and tobacco, using a plow and cultivator, until four years old; I plant nothing in a bearing orchard, and cease cropping when they commence to bear. Windbreaks are essential here, and I would make them of Osage orange and forest-trees; if Osage orange is used, plant it twenty feet from the orchard, or it will injure the fruit-trees. I wrap my trees with corn-stalks or rags to protect from rabbits, and wash the trees with lye water for borers; I also dig them out. I have pruned with clippers, and found it injurious to the trees; I only cut out watersprouts. I never thin my apples; they thin themselves. My trees are in mixed plantings and bear well.

I fertilize my orchard with barn-yard litter; I also use fertilizer from the chicken yard, and would advise its use on all soils. I never pasture my orchard; it injures the trees, and does not pay. My trees are troubled with canker-worm, tent-caterpillar, flathead borer, and leaf-roller. Curculio trouble my apples. I do not spray, but my neighbors do, and are not successful. I pick my apples by hand into half-bushel baskets, and put them in a wagon, with hay in the bottom. I sort into three or four classes, putting the red, yellow and green in separate piles. I pack my apples in sacks, and haul to market in a wagon. I often sell in the orchard; retail my best at stores, peddle the second and third grades, and make cider for vinegar of the culls. My best markets are Elmdale, Chase county, and Marion, Marion county; have never tried distant markets. We dry a few apples; use a parer, corer, and slicer; it is satisfactory; then pack them in flour sacks; but it does not pay. I store some in boxes and barrels in a cave; am successful; those that keep best are Romanite and Red Winter Pearmain. Never have tried artificial cold storage. We have to repack stored apples before sending to market; lose about five per cent. Prices have been from fifty cents to one dollar per bushel, and dried apples five cents per pound. I employ farm hands at from ten dollars to eighteen dollars per month.

THOMAS W. SMITH, Baxter Springs, Cherokee county: Have lived in Kansas twenty-eight years. My trees were destroyed in the storm of 1895. For commercial purposes I prefer Ben Davis, Winesap, and Missouri Pippin. Prefer hilltop

with an east slope. I cultivate at six years; seed a bearing orchard to clover. Windbreaks are not essential. Never thinned apples. Pasture my orchard with cows and horses. Prices during winter have been forty cents per bushel.

S. H. BAILEY, Uniontown, Bourbon county: I have lived in Kansas fifteen years, and have an orchard of 150 apple trees thirty years old. I prefer Canada Pippin [Downing calls this White Pippin], Ben Davis, Rome Beauty, Jonathan, Missouri Pippin, and Maiden's Blush, for all purposes. I prefer hillside land, with a northeastern slope. I plant apple trees thirty feet apart each way. I cultivate in potatoes, corn, or any hoed crop, using a hoe and cultivator. I sow a bearing orchard to clover, and cease cropping at ten or twelve years. Windbreaks are essential, and I would make them of Osage orange planted thirty feet from the trees. I prune a little every year, to get rid of dead limbs, and also thin out the center of trees, to improve the fruit. I use a saw and knife. My trees are in block. It is beneficial to mulch with old hay or straw in drought. I pasture my orchard with small calves, but would not advise it, as it does not pay. I sprayed with a pump, using London purple, but it did little good. I cut borers out, and then pour coal-oil in the holes. I hand-pick my apples in a sack, using a ladder. I sort into two classes—good and second best. If for home use, I put them in rail pens for about three weeks; then sort out the good ones and make cider of the culls. I pack in three-bushel barrels, and ship to Kansas City. I sell my best apples to shippers. I dry and make cider of the second- and third-class apples, and feed the culls to the hogs and cows. I store some for home use, and would store more if I had cold storage. We have to repack stored apples before selling, and lose about one-half of them. I have sold Canada Pippins from fifty cents to two dollars per bushel. I employ men and boys, and pay from fifty cents to seventy-five cents per day and board.

W. T. WALTERS, Emporia, Lyon county: I have been in Kansas nearly twenty-one years. I have 700 apple trees; 200 thirty years old, 100 eleven years old, and 400 seven years old. Market varieties, Ben Davis, Winesap, Missouri Pippin, and Jonathan; and for family have added Red Astrachan, Red June, Early Harvest, Maiden's Blush, and Rambo. I prefer bottom land if not too low; I have apples when they dry up on the hill. Prefer a rich, dark loam, with a slightly porous subsoil, and northeast slope. Use two-year-old thrifty trees, with well-balanced head. Fall plow deeply, throw two or three furrows each way, leaving a deep dead furrow, cross lightly with one furrow, and plant at the crossings. I grow corn, sweet and Irish potatoes for eight or ten years, then seed to clover. I cultivate with a one-horse plow, using a hoe around trees. In my oldest orchard I grow nothing, but use the disc freely. I believe windbreaks necessary on upland, but not in our bottom. Use corn-stalks tied around the tree for rabbits. I prevent borers by keeping the trees thrifty. I prune with knife and saw only to remove dead limbs and keep others from rubbing together, and I think it pays. I think thinning would pay, with cheap labor. Have used coarse stable litter in my orchard; think it has paid in larger and better-colored fruit; would advise its use for bearing trees. I would pasture my orchard with calves, hogs, and sheep, if I had them; I believe if judiciously done it would pay. I spray before the buds open, after the bloom drops; and ten days later, with London purple and lime, for canker-worm and codling-moth; have kept the canker-worm in check, but have not prevented my apples from getting wormy and falling. I hand-pick in sacks and baskets; pack in tight, eleven-peck barrels; but sell most of my apples in the orchard to teamsters from the West. I

sell culls to the cider and canning factories. My best market is in the orchard. Never shipped but once; not satisfactory. I store some in tight barrels in the cellar, and find Winesaps keep the best. We lose from ten to twenty-five per cent. of them; some winters they keep better than others. Never dried any, and have not irrigated. Prices from thirty to fifty cents per bushel at picking time. I use men and boys at from fifty cents to one dollar per day.

C. L. KENDRICK, Waverly, Coffey county: I have lived in Kansas twenty-five years. Have an apple orchard of 375 trees, eighteen years planted. For commercial purposes I prefer Ben Davis, Jonathan, Missouri Pippin, and Winesap; for family orchard, Early Harvest, Summer Queen, and Sherwood's Favorite [Chenango]. Have tried and discarded Bellflower and Rawle's Janet; they are a failure. I prefer hilltop, with a deep clay soil, slightly sandy, and a north or northeast slope. I prefer two-year-old trees, with smooth, heavy bodies, and a low top, set in holes forty feet apart, with a little loose dirt thrown in the bottom, the trees leaning a little to the southwest. I cultivate my orchard to sweet corn and castor-beans, using a disc run deep, excepting close to trees; I cease cropping after five years, and sow a bearing orchard to clover. Windbreaks are essential, and I would make them of maple, Russian mulberry, or Osage orange, set in rows close together, and cut top off maples at four feet. I use building paper as a protection against rabbits, and for borers I whitewash the trees; then remove about three inches of earth from the trees and pour some around the roots. I prune with a saw and shears, to admit more air and sun; I think it beneficial, and that it pays. I never thin my fruit on the trees. My trees are in mixed plantings, and I find them and Mrs. Garrison's and several others' are thus more fruitful; the varieties used are Ben Davis, Jonathan, Winesap, Missouri Pippin, and Sherwood's Favorite, planted in alternate rows east and west. I never fertilize my orchard; I think clover left in an orchard for two years and then plowed or cut in with a disc is the best fertilizer for an orchard after it begins to bear. I never pasture my orchard; do not think it advisable.

My trees are troubled with bag-worm, roundhead borer, bark-louse, and fall web-worm. My apples are troubled with curculio. I spray with London purple and lime, with a pump, just after the fruit is formed, for web-worm and curculio. I think I have reduced the codling-moth by spraying. I get after insects not affected by spraying with a knife. I gather apples by hand in a sack, and sort into three classes: the large and smooth, second size, and culls. I sort from the piles after picking; then sell or bury them. I prefer two-and-one-half-bushel barrels, with straw in the bottom and around the sides, marked with a tin tag, and hauled to market in a heavy spring wagon. I sell in the orchard, wholesale, retail, and peddle; I sell my best apples to shippers, peddle the second and third grades, and make cider of the culls. My best market is Ottawa; have never tried a distant market. I store apples in bulk or bin, in a fruit house built on a well-drained place; the house is made of flax straw, posts, and wire or boards to hold the straw in place; the walls are three and one-half feet thick, four and one-half feet high, and the roof two and one-half feet, with ventilator in the center. The door is in the east end. I use two doors, one on the inside, and one on the outside, filling the space between with flax straw. Am successful in keeping apples, and find those that keep best are Jonathan, Winesap, Missouri Pippin, and Smith's Cider. Winter apples have been forty-five cents per bushel.

W. J. ALBRIGHT, Julia, Kingman county: Have lived in Kansas eighteen years; have an apple orchard of 500 trees, six to seventeen years old, four to ten

inches in diameter. I prefer bottom land for an orchard. I cultivate my orchard by subsoiling and shallow cultivation, using a disc and Acme harrow; I grow nothing in a bearing orchard, not even weeds. Windbreaks are essential; would make them of Osage orange or Russian mulberries. Am not troubled with rabbits or borers. I prune some; it makes better trees. I do not thin the fruit while on the trees. I fertilize my orchard with cow-stable litter, but do not think it beneficial. I do not pasture my orchard. My apples are troubled with codling-moth. I sprayed five years with Paris green and London purple, and was not successful. I gather my fruit off the ground. My best market is at home. We dry apples for home use, and do not store any. I irrigate with a windmill and earth reservoir; it makes big trees.

L. J. HAINES, Galena, Cherokee county: Has been in Kansas nineteen years. Has an orchard of 2500 trees, fourteen years planted, averaging eighteen inches in diameter, planted for commercial purposes, and comprising Willow Twig, Ben Davis, and Winesap, which varieties he would also recommend for family orchard. Has tried and discarded Snow and Missouri Pippin, as they would not bear fruit; cannot tell why. Prefers alluvial soil, with clay subsoil susceptible of good drainage, south slope preferred. Cultivates always with plow, leaving a deep center furrow. Tries to eradicate all growth between the trees in a bearing orchard. Believes windbreaks are essential; uses maple. Prunes, to stimulate trunk and fruit growth. Fertilizes with wood ashes, and says they should be used on all soils that lack potash. Pastures his orchard in spring with calves and hogs, and believes it pays. Sprays April 1, April 30, and June 1, with London purple, copperas, Paris green, and Bordeaux mixture. Not fully successful, but believes he reduces the codling-moth. For borers he lixiviates the ground. This, he claims, kills by contact under the ground. Plow in fall in time to let the rains settle in, and too late to keep it from freezing; freeze them out. Sorts into three classes: Middling [fair], bad, and worse. Hand packed in barrels, stem down, best on top, and marked "First class." He sells at wholesale, sometimes in orchard. Feeds culls to stock. Has found Kansas City, Omaha and Denver to be the best markets. Dries apples on Fay drier, made in Cincinnati, for home use only, and not satisfactory. Stores apples for winter in bulk in cave, and finds Ben Davis the best keeper. For help he uses boys at fifty cents per day, and men at one dollar per day.

A. J. SALTZMAN, Burrton, Harvey county: I have lived in Kansas thirty-one years. Have an apple orchard of 500 trees from one to twelve inches in diameter. For commercial orchard I would prefer Early Harvest, Maiden's Blush, Ben Davis, Cooper's Early White, and Jonathan; and for family orchard Early Harvest, Lawver, Jonathan, and Winesap. Have tried and discarded Willow Twig and Large Romanite on account of blight, and the fruit rots and specks. I prefer hilltop, with sandy loam and clay subsoil, and a north or north-west aspect. Prefer two-year-old trees, with good, thrifty roots, planted thirty feet apart each way. I cultivate my orchard to corn, potatoes, Kafir-corn and cane for five or six years, with plow and cultivator, and cease cropping when the orchard begins to bear. I plant bearing orchard to rye, oats, and artichokes, and then turn in hogs. Windbreaks are essential; would make them of evergreens or Russian mulberries, planted four feet apart. I prune with a saw, pruning-hook, knife, and sometimes an ax, to give proper shape to the tree, and to let in air and light; I think it pays. I do not thin the fruit on the trees, but think it should be done. I fertilize my orchard with barn-yard litter, and think it beneficial; I would advise its use on

all soils. I pasture my orchard after five or six years with hogs, and think it advisable and that it pays. My trees are troubled with root aphid, but not bad, and my apples with codling-moth. I do not spray. I hand-pick my apples, in baskets, or in a sack over the shoulder, and put them in barrels, boxes, or wagon. I sort into two classes: first, sound, for market or home use; second, for vinegar. I sort them as I pick, and drop the vinegar ones on the ground, and gather afterwards. I pack my apples in bushel boxes (that is the best way) while picking. I sell apples in the orchard; also wholesale, retail, and peddle. I make second- and third-grade apples into vinegar, or feed them to hogs. My best market is at home. Have tried distant markets, and found it sometimes paid. I do not dry any, and am successful at storing apples in bulk in a cellar; sometimes I bury them; I find Winesap, Limber Twig and Little Romanite keep best. We have to repack stored apples before marketing, losing from ten to fifteen per cent. of them. I do not irrigate, but think it would pay. Prices have been from forty cents to one dollar per bushel; dried apples from five to six cents per pound.

J. B. SAXE, Fort Scott, Bourbon county: Have lived in Kansas twenty-nine years. Have an apple orchard of 800 trees from fifteen to twenty-seven years old. For commercial orchard, I prefer Ben Davis and Willow Twig, and for family orchard would add Winesap and Jonathan. Have tried and discarded Baldwin, Yellow Bellflower, Maiden's Blush, Early Harvest, Sweet Bough, Bailey's Sweet, Roxberry Russet, Fall Strawberry, King of Tompkins County, and several Russian varieties; all are worthless. I prefer hilly land; with loam soil and clay subsoil, northeast slope. I prefer one- or two-year old medium-sized trees, set twenty to thirty feet apart. Plant my orchard to corn, raspberries, and blackberries, using a plow and cultivator—a one-horse cultivator between the rows, for five or six years; cease cropping when the trees begin to bear. Windbreaks are not essential. I poison the rabbits, and am not bothered with borers. Prune a little with a pruning knife to keep the head open; think it pays, and is beneficial. Have never thinned apples while on the trees. I do not fertilize; our soil is rich enough; ashes or potash might be beneficial. I think hogs beneficial in an orchard. My trees are troubled with root aphid, and my apples with codling-moth and curculio. Pick apples by hand from a ladder into a bag. Sort into two classes, perfect and imperfect, from piles on the grass or ground. Pack my apples in barrels by hand, mark with my name, and haul to market in a spring wagon. Generally sell apples in the orchard, also wholesale; peddle the second and third grades, and make culls into cider for vinegar. Never dry any. I stored some in boxes in the cellar last fall, also buried some in the ground, and was successful. Found Limber Twig and Rawle's Janet kept best. We had to repack stored apples before marketing; lost about one-half of those in the cellar, but very few of those buried in the ground. Do not irrigate. Prices were about forty cents per bushel at wholesale in the fall on the trees.

S. F. C. GARRISON, El Dorado, Butler county: I have lived in Kansas twenty-seven years; have an apple orchard of 1000 trees, twenty to twenty-five years old, ten to twelve inches in diameter. I prefer for commercial purposes Ben Davis, Winesap, King of Tompkins County, and Rawle's Janet; and for family orchard Maiden's Blush, Milam, Jonathan, and Sweet Bough. Have tried and discarded Keswick Codlin, Willow Twig and Dominie on account of blight. I prefer second bottom, reddish soil, with liver-red subsoil, and a north slope. I prefer two-year-old, short-trunk, smooth and round trees. In planting, plow both ways with

a coultter and subsoiler, then dig out. I cultivate my orchard to corn for three or four years, using a plow; I cease cropping after eight years, and plant nothing in a bearing orchard. I use sulphur mixed with axle grease to protect against rabbits. For borers I use fish oil spurted in with sewing-machine oiler. I prune the under limbs to prevent hanging on the ground. It does not pay, and is not very beneficial. I thin Rawle's Janet apples when the smallest ones are as large as marbles. My trees are in mixed plantings. I fertilize with stable litter, and think it beneficial; but would not advise its use on all soils. Never pasture my orchard. My trees are troubled with canker-worm, root aphid, twig-borer, leaf-roller, and bark-louse, and my apples with curculio. I spray with London purple and strychnine when the leaves are small; think I have reduced the codling-moth. I pick my apples (from step-ladders where high) into baskets. Sort into three classes: cider, specked, and sound. We leave them in piles until they sweat, then dry and sort. I prefer two-and-one-half bushel barrels, packed with a nice layer on the bottom (this will be top when opened), then mark with the name of fruit, and haul to market by rail or wagon. I sell in orchard, wholesale, retail, and peddle, and make cider of the culls. My best markets are Wichita, Pueblo, Leadville, the Strip, and Eldorado. Have tried distant markets, but it does not pay.

I never dry any for market. I store some apples for winter market in bulk; am not very successful; find Winesap keeps the best. Have to repack stored apples before marketing; lose about ten per cent. I do not irrigate. Prices have been from twenty-five cents to one dollar per bushel; dried apples, four and one-half cents per pound. I employ young men, at from seventy-five cents to one dollar per day. I have sprayed carefully for three years, and am glad to report no worms this year [1898]. Winesap not full—too full and dry last year, Maiden's Blush full, Rawle's Janet very full, Sweet Bough full, Limber Twig full, Milam full, Ben Davis fair, Northern Spy fair, Little Romanite light, Jonathan light, Willow Twig and King (of Tompkins county) full, Talman Sweet full, and Pound Sweet full.

Trees must not be trimmed up too high, as is too much the practice. A low, broad top will hold the least sprinkle of rain longer, and the wind will not have much chance to dry the earth under the trees. There are millions of hair roots just at the surface, in the compost, or loose earth, to immediately absorb the moisture if wind and sun are kept off. The buds set better when the trunks are short, and kept as cool as possible, so that the sap can run freely to the terminal buds, and also make buds, when, if high and dry, no bud formation can occur. Trees should be short in trunk, broad top, and limbs nearly to the ground. No hogs nor calves should be allowed in the orchard, but all the chickens possible. Cut off all dead branches, and fill up vacancies. Trees should be two or three years old when set. When setting make a good large hole, and in the center make a hill or cone of earth. Then spread the roots out in their natural position, and after this fill in some earth and press lightly. Set two or three inches deeper than they grew in the nursery, trim close, and leave no acute forks. Compel the limbs to start at obtuse or right angles from the trunk; if they bend over to the north, anchor with string and stake. The art and science of horticulture are little studied in Kansas. It takes good judgment and a scientific turn of mind to be successful in orcharding. Chemistry, botany and physiology are especially necessary to make it a delightful work in life. We must run back to the original, which was no doubt far beyond anything we as yet have, or we could not improve at all. The beauty ran down as man did, and it will be a long time before perfection is reached.

D. M. ADAMS, Rome, Sumner county: I have lived in Kansas fourteen years; have an apple orchard of 140 trees from eight to twelve years old. For market I prefer Ben Davis, Missouri Pippin, and Winesap. I prefer bottom land for an orchard. I prefer three-year-old trees set fifteen by thirty feet; mine are planted thirty by thirty. I plant my orchard to corn for four years, using a cultivator and harrow, and cease cropping after four or five years. I plant nothing in a bearing orchard. Windbreaks are essential here. For rabbits I use a gun and traps, and for borers I wash with soap-suds. I should thin my apples if there was a heavy crop. I fertilize my orchard with stable litter, and think it beneficial. I do not pasture my orchard; it is not advisable. My trees are troubled with borers. I do not spray.

WILLIAM PRICE, El Dorado, Butler county: Have lived in Kansas thirty-five years; have 1200 apple trees, planted twelve to eighteen years, running from eight to twelve inches in diameter. My market varieties are Winesap, Missouri Pippin, Ben Davis, Large Romanite, and Jonathan; for family I have added Early Harvest, Red June, Red Astrachan, and Maiden's Blush. I have discarded Rawle's Janet, as they grow in clusters and rot on the trees. My location is on hilltop, with a loose clay soil, and a north aspect. I plant two-year-old upright trees, with good roots, in deep furrows thrown out each way, and sub-soiled. I cultivate same as corn, and grow corn as a crop, for small grains and millet breed insects. In the bearing orchard I grow nothing. I cultivate with the disc harrow, cultivator, and plow, until the trees cover the ground, from twelve to fifteen years from planting. I wash the trees three times a year with a solution of soft-soap suds and crude carbolic acid. I believe windbreaks are essential, and would make them of rapid, dense-growing trees; I use Russian mulberry, planted in three rows, twelve feet apart, mismatched. For rabbits I rub the trees with sulphur and grease. If trees are washed with carbolic acid and soap-suds, no borer will ever attack them. I trim very slightly to keep down watersprouts; to trim as they do in the East does not pay here. I do not thin, but believe fruit would sometimes be larger and better for it. I believe in fertilizing, and prefer cow-yard litter, sheep litter, and hay; on rich bottom land I would use hay mulching. Mulching should be removed from around the trees for hoeing, and then replaced. I never pasture an orchard.

Am troubled some with canker-worm, twig-borer, and codling-moth. I spray three or four times in a season, from eight to ten days apart, according to the weather, beginning as soon as the blossoms appear, with a large force-pump, and a rod with double nozzle, for canker-worm, web-worm, and codling-moth. I have lessened the codling-moth by using copper sulphate solution very early [?]. For borers I use London purple, copper sulphate, Bordeaux, and Paris green [?]. We pick by hand, and sort into two classes: First, the finest fruit; third, the culls, and second, between. Sell some in the orchard, from a bushel to wagon-loads. Sell my best apples on orders from merchants and citizens. The second grade same as the first, if desired. The culls I make into vinegar, which I sell in the home market. Our best market is at home. I tried shipping, but transportation charges were too high; have not tried drying. I store for winter outdoors, covered with hay and dirt, so as not to freeze. The Romanite keeps best. I make my piles of twenty bushels, and lose perhaps one-twentieth. Do not irrigate. Prices of late: First class, fifty cents; second class, thirty-five cents per bushel. I use young men and boys at from fifty cents to one dollar per day and board. I have one of the best small orchards in the state. Have been successful in planting and growing trees.

R. E. LAWRENCE, Wichita, Sedgwick county: I have resided in the state twenty-eight years; have an apple orchard of 300 trees from twenty to twenty-four years old. For market I prefer Missouri Pippin and Ben Davis, and for family orchard would add Winesap, Early June, and Grimes's Golden Pippin. I prefer bottom land with a sandy loam soil and porous subsoil. I prefer two-year old trees set thirty feet apart each way. I cultivate my orchard to corn or potatoes for several years, using a common cultivator; cease cropping when they begin to bear, and sow to orchard-grass. Windbreaks are essential; would make them of forest-trees. I prune to thin the branches; think it beneficial. Do not thin the fruit while on the trees. My trees are in mixed plantings. I do not fertilize my orchard. I do not pasture my orchard. Codling-moth troubles my apples; have not sprayed. Pick my apples by hand; sort into two classes—marketable and cider. I sell some apples while in the orchard at retail. Sell my best apples in home market, and make cider of culls. Never tried distant markets. Do not dry any. Do n't store any. Do not irrigate. Prices, have been from twenty-five cents to one dollar per bushel.

S. S. WEATHERBY, Le Roy, Coffey county: Have lived in Kansas twenty-seven years. Have 500 apple trees, twelve years planted, six inches in diameter. Grow only Ben Davis, Winesap, and Missouri Pippin. Have discarded Willow Twig on account of blight. My location is in the bottom, with rich loam and sandy subsoil. I have planted in rows thirty-two feet distant; cultivate in corn for four years after planting, and use the disc harrow as much as possible. In a bearing orchard I would put clover. Believe windbreaks are essential, made of any kind of forest-trees, planted thickly, in two or three rows around the orchard, and cultivated while small. Protect from rabbits with a dog and gun, and also by wrapping the trees. Prune very little; simply keep down sprouts and remove crossed limbs. Have never thinned on the tree, and believe barn-yard litter useful as a fertilizer. I pasture with a few calves, but think it does not pay. Am troubled with some insect, and spray moderately in May with London purple, for web-worm and leaf-crumpler. Pick from the wagon, driving under the trees. Sell at both wholesale and retail, and my best market is the commercial buyer. Feed my culls mostly to the pigs. Never have dried any, nor stored any for winter. Have a pipe running from my water-tank, by which means have watered a few trees for a number of years, and these trees are very large and yield very fine fruit. If I were to start again, instead of planting 500 apple trees I would plant sixty, and dig a well and put a windmill in the midst of them; and I am confident I would get more satisfactory returns.

J. A. MULLINEAUX, Cherryvale, Montgomery county: I have been in Kansas twenty-nine years. Have 350 apple trees of various ages and sizes, mainly Ben Davis and Missouri Pippin. Have tried and discarded the Romanite as too small. I prefer bottom or second-bottom land, red soil, with sandy subsoil, and a south slope. I plant two-year-old trees in the spring, 32x32 feet; cultivate for four years, growing oats as a crop; also grow oats in a bearing orchard. Believe windbreaks or an Osage-orange hedge are beneficial. I tie corn-stalks around my trees to keep off the rabbits. I never prune at all. Do not thin fruit on the trees. I fertilize with stable litter while trees are young. Believe it pays to pasture orchards with hogs, as they destroy worms. I am troubled some with borers, web-worms, and codling-moth, but have never practiced spraying. I pick by hand, and sort into first and second classes, and pack in bushel boxes, selling at wholesale; haul to market on a rack; make my culls into cider. My

best market is Cherryvale. Never have dried any. Do not irrigate. I store for winter in bulk in the cellar, and am successful in keeping Missouri Pippin and Ben Davis. Price here is \$1.50 per bushel.

O. M. RECORD, Thayer, Neosho county: Have lived in Kansas twenty-one years; have 400 apple trees eight years old. My land is eastern slope, clay subsoil; I plant 20x28, first subsoiling the row. Cultivate to corn and potatoes with a plow, common cultivator, and five-tooth cultivator, until eight years old; then sow to clover. I believe a windbreak is essential, and like Russian mulberry planted on the south and west. To protect from rabbits and borers I use a wash made of soap, lime, and crude coal-oil. I prune with the shears to balance the top properly, and think it pays. I think varieties that grow in clusters like Rawle's Janet should be thinned to a single specimen. I use stable litter, as my land is a light, sandy loam and needs it. I pasture my orchard with hogs, but not too many; if they run short of feed they will sometimes bark the trees. I am troubled some with canker-worm, tent-caterpillar, leaf-roller, and codling-moth. I spray as soon as the bloom is off and twice afterwards with lime and crude oil, to kill the leaf eaters and fungus, and have probably reduced the codling-moth. I look for borers in the fall and dig them out with a knife. My orchard is yet too young to describe picking, sorting, etc. I intend to build a pond and try wetting the ground when the trees need it.

CHAS. DIEMURT, Murdock, Butler county: I have been in Kansas thirty years; have 400 apple trees eight years old. I have Ben Davis, Winesap, Missouri Pippin, Dominie, Grimes's Golden Pippin, Rome Beauty, Rambo, Early Harvest, Bellflower, Rawle's Janet, Willow Twig, Red June, Maiden's Blush, and Duchess of Oldenburg. I prefer hilltop, with sandy soil, and a red, sandy subsoil, with western slope. I plant two-year-old, low, stocky trees, two rods apart each way. I cultivate with plow and cultivator. I whitewash with lime and blood to keep the rabbits off, and lime to keep off borers and other insects. I prune, taking off only surplus limbs, and think it beneficial. I never thin apples. I fertilize to improve the tree; I think it advisable. Am troubled with canker-worm, leaf-crumplers, and codling-moth. I spray when the leaves are just out with London purple for canker-worm, and think I have reduced the codling-moth. For insects that are not affected by spraying, I wash the trees with lime during the fall, and in the spring with strong soap-suds. I pick my apples by hand, and sort into two classes—best for eating, second for cider. For packing I prefer boxes made of slats [lath?], two feet wide by four feet long, and one foot deep. I sell some in the orchard, make cider of the culls, and store some in boxes, and am successful. I find the Missouri Pippin and Winesap keep best. Prices have been from fifty cents to one dollar per bushel.

F. M. SAVAGE, Burden, Cowley county: Have been in Kansas twenty-seven years; have a small orchard of 375 trees that have been set from four to twenty-two years. I would recommend for all purposes Ben Davis, Winesap, and Missouri Pippin. Tried Northern Spy, but it did not do well. My location is on hilltop, north slope, with a black loam soil and clay subsoil. I plant two-year-old thrifty trees with a spade, in large, deep holes. Would cultivate as long as they live, with a plow, and grow no crop among the trees. I think a windbreak of several rows of Osage orange on the south side is a necessity. For borers and rabbits wash with whale-oil soap, digging out any borers that may be in with a knife. I prune with a knife, saw, and ax, and believe it pays. I use stable lit-

ter in my orchard. Tried pasturing my orchard once with hogs, but do not think it advisable. Have some borers, tent-caterpillars, and codling-moth, but have never sprayed any. Pick in baskets, buckets, and sacks, and sort into two classes—first, to sell or put away; second, culls. Prefer large boxes, with the fruit laid in carefully, each kind by itself. I wholesale as many as possible, sell some in the orchard, and make cider of culls. My best market is at home. Have never tried drying. Keep them successfully over winter in bulk in the cellar for family use; Winesap keeps best. Prices have run from twenty-five cents to one dollar per bushel.

S. B. BROWN, Waverly, Coffey county: I have lived in Kansas twenty-six years. Have 1100 apple trees from three to twenty-five years old. My market varieties are Winesap and Missouri Pippin; for family orchard I add Yellow Transparent and Grimes's Golden Pippin. My location is hilltop, with a northern slope. I plant two-year-old trees by running a furrow with a plow and opening holes with a shovel. I cultivate with a plow and cultivator from ten to twelve years, growing corn for ten years; after that, nothing. I believe windbreaks are essential, and would make them of Osage orange or maples, on the east, north, and northwest. For rabbits I wrap the trees; for borers I wash with soft soap. I prune to make the apples larger. I use stable litter between the rows. I do not think it advisable to pasture the orchard. I do not spray, and am troubled with canker-worm, flat-headed borer, and curculio. We hand-pick into sacks, and sort into four grades—No. 1, No. 2, No. 3, and culls. I peddle my best apples; make culls into cider. My best market is Waverly; never tried distant markets. I have dried apples on the Zimmerman drier with satisfaction. I box the dried product and find a ready market for it, and think it pays. I do not store any apples. The prevailing price for apples is fifty cents per bushel, and for dried apples twelve cents per pound. I use men for help, and pay one dollar per day.

DICK MAY, Elk, Chase county: Have lived in Kansas since 1860. Have a family apple orchard of sixty trees eighteen years old. I prefer Ben Davis and Winesap, on bottom land with a second slope. I cultivate my orchard fourteen years, using a cultivator, and plant corn in a young orchard and orchard-grass in a bearing orchard. Windbreaks are essential; I would make them of timber by planting in groves. For rabbits I wrap the trees; and use soap-suds for borers. I prune with a pruning-knife, and think it pays. I do not thin the fruit while on the trees. I would advise the use of fertilizers on all soils. I do not pasture my orchard; do not think it advisable; it does not pay. My trees are troubled with roundhead borer, and tent-caterpillar. I do not spray. I pick by hand and sort into two classes. I haul to market in a wagon and wholesale them. I have put apples in cold storage and find Winesap and Missouri Pippin keep best and satisfactorily. I have to repack stored apples before marketing, I do not irrigate. Prices have been from fifty cents to one dollar per bushel, and dried apples six cents per pound.

E. O. BEAVERS, Ottumwa, Lyon county: Have been in Kansas twenty-three years. Have 2000 apple trees, from one to twenty-three years planted. Prefer for market Winesap, Mammoth Black Twig, Gano, Ben Davis, and Missouri Pippin; and for family use Winesap, Mammoth Black Twig, Gano, Ben Davis, Jonathan, and Early Harvest. Have tried and discarded Lawver, because they do not hang on until maturity. I prefer a north slope of high, level, bottom land,

with black soil and clay subsoil. Plant two-year-old, whole-root, round-topped trees, in large holes dug two feet deep and filled for six inches with surface soil, packed well. Have now in bearing some good seedlings. Grow corn in orchard from eight to ten years, and cultivate the tree rows well with shallow plowing, and harrow and cultivator. After ten years sow to red clover. Want a wind-break of timber on south. Shoot the rabbits. Prune with saw and axe to "get nicer apples," and think it pays exceedingly well. Prefer to plant in blocks of a kind, as they are more fruitful. Use stable litter, but not close up to the trees. Believe it pays to pasture with hogs, if not overstocked. Have canker-worm and codling-moth; spray three times, the first before blooming, for canker-worm. Have surely reduced codling-moth by spraying. Borers never bother any. Pick by hand from common ladders, with sack over shoulder. Sort into three classes: No. 1 perfect, No. 2, and culls. Have a different man to pick out each grade. Use eleven-peck barrels; face two layers, then fill, shake, and press. Usually sell marketable fruit in orchard to shippers. Sell culls by wagon-loads in orchard. My best near-by market is Emporia, Kan. Have shipped to a distant market and made it pay. I have stored some in barrels in cellar, and all kept well, Wine-sap perhaps a little the better. Prices range from forty to sixty cents per bushel. I employ the best experienced men I can get, and pay one dollar per day of ten hours.

J. ELLISON, Chautauqua, Chautauqua county: Has lived thirty-two years in Kansas. Has an orchard of 800 trees—300 fifteen years, and 500 twelve years planted. Prefers Ben Davis, Missouri Pippin, Rawle's Janet and Jonathan for market, and for family use adds Maiden's Blush. Has discarded every other kind; and the above are the only profitable ones. Prefers sandy loam with clay subsoil, high eastern slope, protected on north. Sets three-foot yearling trees in spring, marking out with fourteen-inch plow, thirty-five feet apart each way, and set at crossing. Cultivates with stubble plow in April, then keeps harrow going until August 1. Uses hoe around trees. Grows corn in orchard until ten years old; then keeps ground well cultivated. Does not desire windbreaks. Feeds the rabbits poisoned fruit. Says borers are not troublesome if cultivation is kept up every two weeks through June and July. Prunes any time from January to June, to improve the fruit and prolong the life of the tree. Says stable litter on all sandy loam, not nearer than three feet from the tree, will make the fruit larger, crisper, and better flavor. Allows no stock but poultry in the orchard. Sprays with London purple, on April 10, 20, 30, and May 10, for canker-worms, and destroys them completely. Has cleaned out the codling-moth, too. For borers he washes his trees in June and September with carbolic acid ten pounds, sulphur forty pounds, lime enough to make a thick whitewash. On picking he sorts into three grades: No. 1, select, large, sound, smooth; No. 2, small and sound; No. 3, knotty and specked. Uses for marketing one-bushel baskets packed full. His best market is in the orchard, selling by wagon-loads. He uses some culls for vinegar and gives many to his neighbors. Does not dry any. Stores some for winter in trenches in bulk, in the soil, covered with pure earth, and they keep as follows: Missouri Pippin, first; Rawle's Janet, second; Ben Davis, third. Prices vary from forty cents to one dollar per bushel. Uses common farm help at sixty cents to eighty cents per day.

N. SANFORD, Oswego, Labette county: I have lived in Kansas twenty-seven years. Have an apple orchard of 150 trees, twenty-four years old, ten inches in diameter. For all purposes I prefer Red June, Jonathan, Grimes's Golden Pip-

pin, Rome Beauty, and Winesap. Have tried and discarded Ben Davis, White Winter Pearmain, Red Winter Pearmain, and Missouri Pippin; they do n't do well here. I prefer clay bottom land with north aspect. I prefer well-grown two-year-old trees, set a little deeper than nurserymen recommend. I cultivate my orchard to corn or potatoes four years, using a five-tooth cultivator, and cease cropping after six years. I plant nothing but raspberries and blackberries in a bearing orchard. Windbreaks are not essential. For rabbits I wrap the young trees with cloth. I prune the tree while young to give shape and get rid of dead branches; I think it pays. I do not thin my apples while on the trees; it does not pay. I fertilize my orchard with stable litter and ashes; would advise their use on all soils. I pasture my orchard in early spring and during the fall and winter with horses and cattle; think it advisable, and that it pays. My trees are troubled with canker-worm, bud moth, root aphid, and twig-borer, and my apples with codling-moth, curculio, and gouger. I spray with a force-pump; use Paris green, London purple and Bordeaux mixture for canker-worms and all other pests. I pick my apples from ladders with care; sort into two classes—first, all large and sound; second, small and sound; pack them in eleven-peck barrels as we pick them; fill the barrels full with a little pressure; mark with variety and grade. I wholesale, retail and peddle my apples; I evaporate the second and third grades and culls. My best market is Colorado; I have tried distant markets and found they paid. I dry apples with a home-made drier, which is quite satisfactory; after they are dry we pack in fifty-pound boxes, but do not find a ready market; they pay some years if the quality is good. Am successful in storing apples in barrels in a stone cellar, and find Winesaps keep best. I have to repack stored apples, losing about one-sixth or one-eighth of them. Do not irrigate. Prices have been from fifty cents to one dollar per bushel; dried apples from five to nine cents, if fancy. I employ women at fifty cents per day for preparing the evaporated apples.

C. G. WICKERSHAM, Parsons, Labette county: I have lived in Kansas twenty-six years. Have an apple orchard, the oldest of which are twenty-seven years. For all purposes I prefer Jonathan, Grimes's Golden Pippin, and Winesap. I prefer hilltop, with the very best of black soil, having a north or northwest slope. I prefer two- or three-year-old medium-sized trees, set in holes dug for them. I cultivate my orchard to potatoes, using a common cultivator, and cease cropping after ten or fifteen years; nothing should be planted in a bearing orchard. Windbreaks are essential; would make them of three to six rows of elms. We destroy all the rabbits we can. I prune the trees when first set out to shorten in the limbs; then keep it up every year; it pays big. I do not thin the fruit on the trees; the wind does it for me; it pays to not have the trees too full. Makes no material difference whether the trees are in block of one variety or mixed plantings. I fertilize my orchard with slightly rotted stable litter, and think it pays, and is beneficial. I would advise its use on all soils, but not as extensively on rich soils. I pasture my orchard with chickens only; they are a benefit and pay well. My apples are troubled with codling-moth, curculio, and bud moth. I spray with London purple, Paris green, and Bordeaux mixture. I pick my apples by hand, sort in from three to six grades, and put them on hay in the shade. Pack in one- and one-and-a-half-bushel packages. I wholesale, retail and peddle a very little. Give the culls to neighbors who have no apples. Have tried distant markets, but it did not pay. Home market is best. I do not dry any. I store some in a frost-proof house. Have to repack stored apples. I water my orchard frequently.

O. W. HECKETHORN, McPherson, McPherson county: I have resided in Kansas twenty-four years; have an apple orchard of 350 trees; 180 of them are twelve years old; the balance are younger. For market I prefer Missouri Pippin and Maiden's Blush; for family use, Maiden's Blush. I prefer a sandy loam with an east or northeast aspect. I prefer two-year-old, low-headed trees, planted in rows thirty feet apart. I cultivate my orchard as long as the weeds grow, and plant a young orchard to corn, using a small cultivator and disc. Cease cropping after eight or nine years, and plant nothing in a bearing orchard. Windbreaks are essential; would make them of peach trees planted close together. I have pruned to shape trees, but do not prune at all now. I do not thin the fruit while on the trees. I fertilize my orchard with stable litter; I think it beneficial, and would advise its use on all soils. I do not pasture my orchard. My trees are troubled with tent-caterpillar, and my apples with curculio.

A. B. MANN, Toronto, Woodson county: I have lived in Kansas twenty-eight years. Have an apple orchard of fifty trees, twenty years old, twelve inches in diameter. For all purposes I prefer Ben Davis, Winesap, Jonathan, and Missouri Pippin. My trees are planted on a hilltop, with north slope, having a black limestone soil. I prefer two-year-old trees, set in rows twenty feet apart. I cultivate my orchard to sweet corn until four years old, using a plow and harrow, then cease cropping; put clover in a bearing orchard. We make windbreaks of Osage orange on the north side of the orchard. For rabbits I use lath, and dig borers out. I prune with a chisel and mallet; think it pays. I do not thin the fruit while on the trees. I do not mix my trees when planting. I fertilize my orchard between the rows with stable litter; would not advise its use on all soils. I have pastured my orchard with hogs, but do not think it advisable, as it does not pay. My trees are troubled with tent-caterpillar and flathead borer, and my apples with codling-moth. I do not spray; my neighbors do, without success. I hand-pick my apples.

D. W. COZAD, La Cygne, Linn county; I have resided in the state twenty-five years. For market I prefer Ben Davis, Jonathan, Willow Twig, and Missouri Pippin, and for family orchard, Early Harvest, Maiden's Blush, Winesap, Rawle's Janet, and Huntsman's Favorite. Have tried and discarded Lawer, Yellow Bellflower, Gilpin, and Cooper's Early White, on account of shy bearing, poor quality, and small size. I would choose hill for some and valley land for others, according to variety planted; would prefer southeast aspect with limestone soil and porous subsoil. I prefer one-year-old trees. I cultivate my orchard to corn and potatoes, using a surface cultivator and harrow; cease cropping at bearing age and sow to clover. Windbreaks are essential. I would make them of double rows of evergreens on the north and west. Protect from rabbits and borers by "eternal vigilance." I prune with a saw and knife for symmetry, air, and light, and think it pays. I thin the fruit while on the trees, at different times; it pays. I fertilize my orchard with stable litter and clover; would advise its use on all soils. I pasture my orchard with hogs; think it advisable, and that it pays. My trees are troubled with canker-worm, tent-caterpillar, root aphid, flathead borer, and woolly aphid; my apples with codling moth and curculio. I pick my apples by hand; sort into three classes, sound and large, sound and small, and culls. I sell apples in the orchard, wholesale, retail, and peddle. Sell my best apples from the cellar, also second grade. Of the culls we make cider and feed to the hogs. My best market is at home. I do not dry any. I am successful in storing apples in barrels in a cellar and a cave; I find the Gilpin, McAfee, Rawle's

Janet and Willow Twig keep best. I have to repack stored apples before marketing, losing about one-twentieth of them. I do not irrigate. Prices have been: Summer, twenty-five to thirty cents; fall, forty to fifty cents; winter sixty to eighty cents per bushel. I employ men at ten cents an hour.

W. M. BARNGROVER, Hamilton, Greenwood county: I have been in Kansas seventeen years, and have an orchard of 100 apple trees fifteen years old, twenty-four inches in circumference. For market I prefer Ben Davis, and for family use Winesap. I prefer bottom land, with a black loam soil and a red clay subsoil. I prefer two-year-old, low-headed trees, set in big holes. I cultivate my orchard about every four years with a disc and harrow, and sow English blue-grass in a bearing orchard. Windbreaks are essential to orchards on the hills; I would make them of a row of maples between every row of apple trees. For rabbits and borers I paint the body of the tree with a solution of coal-tar and carbolic acid. I prune my trees to protect them from the hard winds; always trim the highest limbs—never the low ones. I fertilize my orchard with about twelve inches of old hay for four years, and think it should be used on all soils, as the tree growth will be one-third larger. I pasture my orchard with calves, and think it advisable and that it pays. My trees are troubled with leaf-rollers. I spray with Paris green. In picking, I use a step-ladder and a pole with a hook on the end. On the under side of the pole I sew a long sack [a canvas tube]; the apples fall in this sack and roll down to me. I pack in barrels; sell in orchard; use the waste apples at home. Have tried distant markets; it did not pay. Do not dry any. I store apples for winter in barrels, and find White Winter Pearmain keeps best. I have to repack stored apples before marketing; the loss depends a great deal on the season. I do not irrigate. Prices have been from thirty cents to one dollar per bushel. Home-dried apples, four and one-half cents per pound.

DAVID LEHMAN, Halstead, Harvey county: I have resided in Kansas nineteen years; have an orchard of 180 apple trees sixteen years old, eight to twelve inches in diameter. For market I prefer Winesap, Missouri Pippin, Ben Davis, and Jonathan, and for family orchard would add Maiden's Blush. I prefer hill-top with a black loam and an east slope. I prefer one- or two-year-old trees, two feet tall, with good roots, set thirty feet apart in rows. I cultivate my orchard to corn for ten years, using a harrow and five-tooth cultivator very shallow. Cease cropping after ten years, and plant turnips in a bearing orchard. Windbreaks are essential; would make them of red cedar, ash, or catalpa, by planting eight by eight feet in rows. I prune my trees when young with a pruning-knife to get rid of all unnecessary limbs; I think it pays. I fertilize my orchard with stable litter that will not heat, and would advise its use on all soils, but lightly on rich soils. I pasture my orchard with hogs, but do not think it advisable; it does not pay. My trees are troubled with borers, and my apples with curculio. For insects not affected by spraying, I use one box of concentrated lye and four ounces of tincture of tobacco to four gallons of water; wash well with a swab three times a year—the 15th of June, July, and August.

W. W. GARDNER, Chanute, Neosho county: Has lived in Kansas thirteen years. Has 1000 well-grown trees, set seven years. Prefers for commerce Ben Davis, Winesap, Missouri Pippin, and Huntsman's Favorite, and for family orchard adds Maiden's Blush and Rome Beauty. Prefers north slope, upland. Plants two-year-olds, with straight centers, at sixteen to eighteen feet apart, in

rows twenty-two to twenty-four feet apart. Cultivates with two-horse cultivator, often enough to keep the weeds down; then harrows, aiming to keep the ground mellow. Grows corn from nine to ten years, then clover; says small grain hurts trees. Thinks evergreens best for windbreaks, but does not think such protection essential. Keeps dogs for the rabbits. Prunes with hedge shears, and says it certainly pays. Believes barn-yard litter beneficial in any orchard, on any soil. While he thinks pasturing not advisable, and that it will not pay, he says he will probably pasture in fore part of seasons with calves, after he has seeded to clover. Sprays with London purple and lime as soon as canker-worm appears. Is not troubled with borers. Would irrigate if he could. Has yet had too little fruit to market.

HENRY NEIL, Weir, Cherokee county: Have lived in Kansas twenty-eight years; have 148 apple trees, from three years old to very large. For market I use Ben Davis; for family, Early Harvest, Winesap, and Romanite. I prefer hilltop, with an eastern slope, black loam soil, with gravelly subsoil. I plant two-year-old thrifty trees, thirty-three feet apart each way, in the spring. I cultivate until they bear, growing corn and potatoes, after that grass. I prefer a disc cultivator. I think windbreaks are a great help; and Osage orange is the best I know of. For rabbits I tie stalks or wire cloth around the tree. Have never had any borers. I trim with a saw and knife to take out superfluous wood and give light, and I think it pays. I never have thinned any. I think barn-yard fertilizer will pay in the orchard. I pasture my orchard very little, and think it does not pay. I have never sprayed any, and believe tent-caterpillar is the worst insect that troubles me. I pick in a sack tied over my shoulder, and sort into three classes—number one, the very best; number two, those that are specked; number three, culls. I generally sell to retailers, at our home market, and make cider of the culls; never tried a distant market. Have never dried any. I store sometimes in bulk in a cellar under the house, and find that Winesap and Romanite keep the best. Prices run from twenty-five cents to one dollar per bushel, and dried fruit from two and a half to six cents per pound. I use regular monthly farm help.

JOHN A. MAGILL, Roper, Wilson county: I have resided in Kansas thirty-one years. Have an orchard of 7000 trees, sixteen acres of it twenty-five years old, and sixty acres six years old. I think Ben Davis and Missouri Pippin are the best varieties for all purposes. Discarded the Bellflower because it would not bear. I prefer bottom land with a north aspect, black soil, and clay subsoil. Plant good one-year-old trees, 33x20 feet. Cultivate with plow and "gopher." I grow corn and castor-beans in the orchard as long as it will pay. Believe windbreaks are necessary, made of anything that will check the wind; would plant trees on the south and west. Keep rabbits off by wrapping. I prune enough to keep in shape. I believe it pays to pasture the orchard with hogs in the winter, and think they get away with canker-worms. I spray for canker-worm and codling-moth with London purple, and think I have checked the codling-moth to some extent. I pick and sort by hand in two classes only—marketable and culls. I wholesale in bulk, make cider of the culls, and find my best market in Texas. I never dry any; never store any for winter; have never irrigated. Average price about forty cents per bushel.

J. T. COCHRAN, Ottumwa, Lyon county: Have lived in Kansas thirteen years; my orchard is in Coffey county, and contains 800 trees; 100 have been planted

thirty-five years, and 700 twelve years. I market Winesap, Ben Davis, and Missouri Pippin, and add to this for family use Jonathan and some early apples. I prefer ashy bottom land. I would plant trees in good condition thirty by thirty-five feet. Cultivate in corn about eight years, then sow to clover. I believe that a windbreak of hedge or forest-trees should be planted on the southwest, in rows four feet apart. I prune in fall and winter with a saw, and my experience is that it makes better fruit. I have never thinned on the tree. Barn-yard litter scattered through the orchard improves the land. I pasture with hogs early in spring and late in fall; they eat the refuse apples. Am troubled with canker-worm, web-worm, and codling-moth. I spray with London purple and air-slaked lime just as soon as I see the insect, or as soon as the trees are in bloom. I think I have reduced the codling-moth. I pick in a sack tied and hung on the shoulder, using a ladder against the tree. I sort into two classes: No. 1, clear of rot; No. 2, clear of bruises. Pack in eleven-peck barrels, full and pressed. I wholesale mostly; suits me best to sell in orchard. The culls and seconds I sell at home. My best market is Fort Worth, Texas. Freight is too high to send farther. Never dry any; store in a cellar in barrels for home use only. Am not always successful. Winesap keeps best. I lose one-fourth sometimes. Prices range from 70 cents to \$1.37 per barrel. I use good trusty men, at one dollar per day.

W. M. FLEEHARTY, La Cygne, Linn county: Have lived in Kansas thirty years. Have an orchard of 325 trees, mostly thirty years old, twelve to twenty-four inches in diameter. I prefer for commercial purposes Winesap, Ben Davis, and Willow Twig, and for family use Winesap, Willow Twig, Rawle's Janet, and Milam. Have tried and discarded Esopus Spitzenburg, on account of sun-scald. Prefer hilltop with square-jointed [?] subsoil, and northeast slope, deep, rich soil. I plant in check plats. Have tried root grafts. I cultivate until the trees interfere with working. I plant young orchard to corn and potatoes; bearing orchard to nothing, and cease cropping when it injures the limbs of the trees. Windbreaks are essential sometimes, and should be made of Osage orange, because of its quick growth. I prune when limbs interfere. I thin apples a little. Do not mix my trees; bees do the work. Fertilizers are beneficial on all soils. Pasture my orchard with hogs and calves. My trees are troubled with canker-worm, root aphid, bag-worm, flathead borer, roundhead borer, woolly aphid, twig borer, fall web-worm, leaf-roller, leaf-crumpler, and others. My apples are troubled with codling-moth, curculio, and gouger. Spray when the blossoms are open, with Bordeaux mixture; have not reduced the codling-moth. I use the knife on borers and insects that are not affected by spraying. Sort into two classes; have both perfect. Sell in the orchard sometimes. Store some apples for winter market; have not tried artificial cold storage. We have to repack stored apples before marketing, losing one to ten per cent. The prevailing price has been sixty cents per bushel. I employ men at from fifteen to eighteen dollars per month.

F. L. KENOYER, Independence, Montgomery county: I have lived in the state ten years, and have an apple orchard of 240 trees from three to nine years old. For market I prefer Jonathan, Missouri Pippin, and Ben Davis, and for family use add Maiden's Blush. I prefer hilltop with a sandy loam and a porous subsoil. I prefer two-year-old, low-headed trees, with plenty of roots. I plant them one rod north and south, and two rods east and west. I will cultivate my orchard as long as the trees live with a Planet jr. twelve-tooth cultivator. I

plant strawberries in a bearing orchard; they are as good as clover. Windbreaks would be beneficial; I would make them of Osage orange. For rabbits I rub blood on the trees. I dig the borers out with a knife and wire. I prune very little, with the pruning shears, to remove watersprouts and interlocking limbs. It preserves their symmetry, but does not make them more fruitful. I do not thin the fruit while on the trees; the wind does it for me. My trees are in mixed plantings. I fertilize my orchard with stable litter between the trees. It is very beneficial, and I would advise its use on all soils excepting very rich bottoms, where it would cause too much wood growth at the expense of the fruit. I do not pasture my orchard; it is not advisable. My trees are troubled with canker-worm, tent-caterpillar, root aphid, roundhead borer, and leaf-crumpler, and my apples with codling-moth and curculio. I am successful in spraying, using London purple with a pump when the canker-worms appear, and a few days afterward. For root-lice I remove the earth from around the trees and pour in tobacco water. I do not dry any. I do not irrigate. Prices have been forty cents for apples in the fall, one dollar per bushel during the winter, while home-grown lasted, and two dollars per bushel now (April). Dried apples sold for five to ten cents per pound, according to quality.

J. H. BILSING, Udall, Cowley county: I have lived in Kansas twenty-seven years. Have an orchard of sixty apple trees from sixteen to twenty-six years old. For market I prefer Ben Davis, Limber Twig, Jonathan, and Grimes's Golden Pippin, and for family use Jonathan, Grimes's Golden Pippin, Red June, and Maiden's Blush. Have tried and discarded Big Romanite; it is a good grower but a poor bearer. I prefer bottom land with sandy loam and clay subsoil, and a north slope. Prefer thrifty two-year-old trees, set in land which has been plowed as deeply as possible, and the soil loosened fifteen to eighteen inches by digging. My trees are set 30x30 feet; this is a little too wide north and south. I am still cultivating my first planting of trees, use a plow, harrow, and cultivator. Plant corn in a young orchard, and cease cropping after eight or ten years. Windbreaks are essential; would make them of peach groves for quick growth, or for slower and surer growth would make them of several rows of Osage orange or ash, set fifteen to sixteen feet east and west by breaking rows. I prune my trees from the beginning with a pocket-knife; think it pays. Do not thin the fruit on the trees. Fertilize my orchard with ashes and stable litter; think it beneficial, as it keeps the ground from packing, and also keeps the trees vigorous; would not advise its use on very sandy soils. Do not pasture my orchard; am going to try it with young pigs and calves. My trees are troubled with root aphid and borers, and my apples with codling-moth, curculio, and gouger. Have sprayed three seasons, soon after the blossom fell and until the apples were the size of marbles, using London purple; think I killed the first brood of codling-moth, but a later brood came which hurt the fruit.

F. H. BURNETT, Benedict, Wilson county: I have lived in the state fifteen years. Have 2200 apple trees six years old, of fair size. Planted for market Gano, Ben Davis, Missouri Pippin, and Jonathan, and for family use Jonathan, Winesap, Gano, Early Harvest, and Maiden's Blush. Bottom land is best in this locality. I prefer soil somewhat clayish, underlaid with limestone, with a north or east slope. Prefer good one- and two-year-old, stocky, low-headed trees. Would plant on upland twenty by thirty-two feet, and on rich bottom twenty-four by thirty-six feet. I believe in thorough cultivation, and during the first two years I use the hoe. I cultivate until five or six years old, usually growing

corn, as it protects the trees from the strong south winds. I then sow to clover, changing every two or three years to castor-beans or corn. Trees planted close north and south form their own windbreaks. For rabbits, wrap the trees. I prune a little to keep the trees from getting too heavy on the north side. I should thin Missouri Pippins to keep from overbearing. I should use sawdust and barn-yard fertilizer on hard-pan spots. I allow no live stock in the orchard but poultry. Am troubled some with leaf-rollers and canker-worm. I spray as soon as the leaves start, for canker-worm and leaf-roller, using one pound of London purple to 120 gallons of water. For borers, keep the trees thrifty; borers cannot thrive, as the sap will kill them. I believe it would be well during the first two years to wash the trees with a solution of soft soap, coal-oil, and water, in May and June. I sort in first, second, and cider or culls; pack in three-bushel barrels so full they cannot bruise. I expect to put in an evaporator and use natural gas for fuel, and think it will pay. I recommend subsoiling to retain moisture. Prices have ranged here from thirty to fifty cents per bushel.

F. S. HALL, Fulton, Bourbon county: Has lived in Kansas fourteen years. Have 10,000 apple trees from two to eight years old. For commercial purposes the Ben Davis and Arkansas Black are doing best. Will not plant any more Missouri Pippins. My orchard is on a hill, with northeast slope, black soil, set thirty-three feet east and west and sixteen feet north and south. Set one- and two-year-old well-branched trees. Cultivate entirely with a disc, and allow nothing to grow within six feet of the trees. Grow only clover, and expect to grow only clover in my orchard. Think an Osage hedge a good windbreak. Use tar paper and traps against rabbits. Prune nothing above twenty inches from the ground. Never thinned apples on trees. Fertilize with ashes and all the manure I can get, and turn under clover. Think such fertilizers beneficial for apples on all soils. Opposed to pasturing an orchard. Not much troubled with insects. Spray before and after blooming, first with Bordeaux mixture, then sulphate of copper and either Paris green or London purple. Think I have reduced the codling-moth by this method. Keep down borers by cultivation and a wash of lime, concentrated lye, and carbolic acid.

R. N. MARK, Strawn, Coffey county: Have lived in Kansas thirty years. Have an orchard of twelve acres; trees twelve years old. For commercial purposes I prefer Winesap and Ben Davis. Timber bottom is best. I cultivate my orchard to corn and potatoes, and cease cropping when ten or twelve years old; plant potatoes in a bearing orchard. Windbreaks are essential on the south; would make them of forest-trees. To protect from rabbits I wrap young trees, or kill rabbits, cut open, and rub thoroughly on the tree. I prune my trees to give proper shape, and think it beneficial, especially on poor land, as it makes the trees more productive. Do not thin fruit on the trees. I pasture my orchard carefully with hogs and calves at any time when it is not wet. Trees are troubled with canker-worm. I spray early and often with London purple. I pick my apples in sacks from ladders. The shipper [buyer] sorts from barrels in orchard. I sell my first grade in the orchard; also second- and third-grade apples in the orchard. We sell the culls. Do not dry any; does not pay. I store very few. Average price of apples is fifty cents per bushel.

W. M. FRENCH, Chicopee, Crawford county: I have resided in the state eighteen years. Have an apple orchard of 200 trees twelve years old, averaging six inches in diameter. For market I prefer Ben Davis, Winesap, Missouri Pip-

pin, Willow Twig, and Jonathan; and for family orchard would add Early Harvest, Maiden's Blush, and Rambo. Have tried and discarded Limber Twig; it does not mature. I prefer bottom with an eastern or northern slope, having a good deep soil with a clay subsoil. I prefer three-year-old, stocky trees, set in holes dug 3x3 feet and 2½ feet deep, filled with surface soil. I cultivate my orchard to corn as long as I can without injuring the trees, and use a plow; avoid ridging too much. I cease cropping after nine to twelve years. I sow the bearing orchard to millet or something to be mowed. Windbreaks are not essential, but think they would be beneficial; would make them of catalpa or maples, set in two or three rows on north, south and west sides. I prune my trees with a saw to keep the top from getting too heavy; I think it beneficial, and that it pays. Shall not thin my fruit this year. I can see no difference whether trees are in blocks of one kind or mixed. I fertilize my orchard with stable litter, putting it in trenches between the trees; I avoid putting it around them. I think it has proven beneficial, and would advise its use on all soils, unless very rich and the tree growth very strong. I pasture my orchard a little with calves, but do not think it advisable. My trees are troubled with tent-caterpillar. I do not spray. I hand-pick in a basket from a step-ladder. I sort into two classes, and wholesale, retail, and peddle. The home market takes all my best apples; the culls are fed to hogs and made into cider. Never have tried distant markets. Do not dry any. Am successful at storing apples in bulk in a cellar; find Ben Davis, Winesap, Willow Twig and Rawle's Janet keep best. I do not irrigate. Prices have been from fifty cents to one dollar per bushel. *

J. C. Ross, Havana, Montgomery county: Have lived in Kansas twenty-seven years; have an orchard of 100 apple trees twenty-three years old. I prefer for all purposes Ben Davis, Missouri Pippin, and Winesap. Have tried and discarded Rawle's Janet and Romanite. I prefer low land at foot of hills, with deep loam subsoil and a medium slope. I set my trees twenty feet apart. I cultivate in oats and corn up to bearing with common twelve-inch stirring plow. Windbreaks are essential on north; would make them of Osage orange planted in rows. Rabbits are hard to contend with; for borers I use a solution of slaked lime. I prune with a saw; do not think it very beneficial, as the rain gets in, and the wood decays. I never thin apples. My trees are in mixed varieties. I mulch my trees with straw, and think it beneficial. I pasture with calves and hogs; do not think it advisable; it does not pay. Am somewhat troubled with insects; I spray with a solution of coal-oil, using a small pump; think I have reduced the codling-moth. For borers I dissolve lime to a paste in water, and apply to the roots with a scrub broom. I pick my fruit from ladders. I sort into three classes: first, second, and third. I use common barrels to pack the fruit in; mark, and send by freight to near-by markets. I wholesale sometimes, and sometimes sell in orchard; market my best apples at near-by towns; I make cider and vinegar of culls. I dry some fruit; use a large pan filled with hot water; then put in sacks and boxes. I find a ready market; think it pays. I store some apples in a cellar in large, open boxes, and in bulk. Some rot; those that keep best are Winesap, Rawle's Janet, and Romanite. We have to sort stored apples before marketing them; we lose from one-fourth to one-third of them. I do not irrigate. Prices have been from fifty cents to one dollar per bushel. I use any kind of help I can get, and pay seventy-five cents per day.

J. K. P. House, Cloverdale, Chautauqua county. I have lived in Kansas twenty-seven years, and have 250 large trees, planted twenty-six years. I prefer

for commercial orchard Ben Davis, and for family orchard Dominie, Early Harvest, Rhode Island Greening, and Grimes's Golden Pippin. I prefer bottom land, with a black loam and clay subsoil, with north slope. I plant two-year-old, medium-top trees, in well-cultivated ground, and mix the top soil with the roots. I have tried root grafts, but not satisfactory. I cultivate shallow every year, using the cultivator after the tree is grown. I grow oats in a young orchard, but nothing in a bearing orchard, and cease cropping when about eight years old. Windbreaks are essential on high ground. I would make them of walnut trees planted in rows. I never thinned the fruit. My trees are in mixed plantings, and prove satisfactory. I do not fertilize, and would only advise it on high land. I pasture my orchard with hogs, and think it advisable. My trees are troubled with tent-caterpillar, bagworm and roundhead borer. I pick in a sack swung around the neck. I sell fruit in the orchard, and make cider of the culls. My best market is at home; but I have shipped to distant markets. It paid in an early day. I have dried some apples in the sun, then heat and pack in barrels, and find a ready market for them, but it does not pay. I store some fruit for home use, and find that Winesap and White Winter Pearmain keep best. I have never tried artificial cold storage. I do not irrigate. Prices have been from \$1 to \$1.50 per bushel, and for dried fruit six to eight and one-third cents per pound.

WILLIAM BURDEN, Leeds, Chautauqua county: Have been in Kansas twenty-one years. Have 400 apple trees from eight to twenty years old. I prefer for commercial orchards Ben Davis, Missouri Pippin, and Winesap, and for family orchard Early Harvest, Maiden's Blush, and Jonathan. Have tried and discarded Willow Twig, Rawle's Janet, and Russet. I prefer limestone bottom land, with north slope. I plant twenty-eight by thirty feet, using two year-old trees. I cultivate eight years with plow and cultivator. I grow corn among young trees, clover in a bearing orchard, and cease cropping after eight years. Need no windbreaks. Wrap trees with corn-stalks to keep off rabbits. I prune to keep down watersprouts and limbs from rubbing; I think it beneficial. Never thin the fruit on the trees. Have not tried mixed plantings of trees. I do not fertilize. I pasture my orchard with horses, but do not think it advisable. My trees are troubled with root aphid, roundhead borer and leaf-roller. Do not spray. I pick fruit by hand. I sell mostly to farmers living farther west; sometimes sell in the orchard and sometimes retail. Make vinegar of culls. Never tried distant markets; never dry any. Store some apples in cave in boxes; am successful; find that Ben Davis, Missouri Pippin and Winesap keep best. Do not irrigate. Prevailing price, thirty cents per bushel; five cents per pound for dried apples.

EBERT SIMON, Welda, Anderson county: Have lived in Kansas thirty-one years; have 300 apple trees, fifteen inches in diameter, twenty years old. I prefer for commercial orchard Ben Davis, Missouri Pippin, Winesap, and Gano; and for family orchard Winesap, Missouri Pippin, and Jonathan. I prefer hilltop, with black loam and porous subsoil, with north slope. I plant three-year-old whole-root grafts. I cultivate in corn for five years with one-horse cultivator; seed a bearing orchard to clover. Windbreaks are essential on the south. I prune with the saw to let the sun in, and think it beneficial. Never have thinned apples. I sometimes use stable litter as a fertilizer, but would not advise its use on all soils. Sometimes I pasture my orchard with hogs and horses, and think it advisable. I hand-pick my apples. I sell in the orchard, peddle the second and third grades, make vinegar of culls, and feed some to hogs; never tried distant markets. Never dry any. Prices have been from \$1 to \$1.50 per barrel.

A SUMMARY OF THE FOREGOING DISTRICT REPORTS.

Ben Davis is the leading market apple, followed closely by Missouri Pippin. These two lead all others, and are followed by Winesap and Jonathan. Rawle's Janet, York Imperial, Huntsman's Favorite, Grimes's Golden Pippin and Maiden's Blush are also favorites. We find the Yellow Bellflower, Newtown Pippin, Lawver and a few others are condemned all over the state.

In the eastern third of the state hilltop or slope is preferred to bottom land, but in the central and western portions bottom land is preferred. The reason for this is obvious: Any good soil is satisfactory, if subsoil is porous.

The favorite distance seems to be thirty-two feet east and west and sixteen to twenty feet north and south, some putting peach or early-bearing apples between, the wide way, to be cut out when they crowd. This undoubtedly brings the quickest returns, but many believe it robs the permanent trees of their future sustenance.

Twenty-four prefer one-year-old trees; 7 one to two years old; 153 two-year-old; 10 two- to three-year-old; 21 three-year-old; 3 want four-year-old, and 59 give no age. It is only a matter of cost and convenience. A one-year-old tree costs less and allows the would-be orchardist to set more trees for a given amount of cash. The one- and two-year-old trees require the removal of less earth, and are more readily handled and planted. There is no reason why an apple tree three inches in diameter cannot be transplanted as easily as an elm or maple. A man is willing to set a few large shade-trees at a cost of one dollar to five dollars per tree, but cannot feel that it is economy to set orchard trees at as great individual expense.

"Whole-root grafts" is a misleading appellation, as it will be found to be only a crown graft. Its advocates make great claims that are at variance with the facts. There can scarcely be such a thing unless grafted on a seedling without removal of such seedling from the earth. Our best nurserymen prefer the second cut, about one and one-half to three inches taken from the seedling root a couple of inches below the crown. In any case the piece of root taken has little influence on the future tree. All our ordinary varieties make roots from the scion, and the original seedling root may be found—like the piece of potato we plant—shriveled and useless in the midst of the new roots. The nature of the root growth shows this plainly, as all its peculiarities will be found to be a counterpart of the roots of the variety from which the scion was cut. It is folly to pay any added price for so-called "whole-root grafts."

A very great majority believe in thorough cultivation, at least for from six to ten years; some during the life of the tree. Nearly all agree that Indian corn is the best crop to grow in a young orchard; it shades the ground, and protects from wind. The corn in a young orchard should not be cut in the fall, neither should the stalks be pastured; let them stand till spring as a partial protection; it pays.

Many parts of the state, especially the western half, believe windbreaks on the south and west very valuable, if not quite necessary. Forest-trees with the outside row or rows of Russian mulberries, and perhaps an Osage orange hedge, seem to meet the general opinion.

As a protection from rabbits, the ever-present cornstalks seem most economical, and the favorite. The cost is little, and the boys and girls, or the farmer and his wife, at odd times can put them on. It is an open question as to the benefit or harm of leaving them on permanently for the first five years. It looks slovenly, but certainly has many arguments in its favor.

The serio-comic idea of boring into an apple tree and placing therein sulphur, asafetida or other drugs does not really deserve a serious thought. It is impossible for the tree to assimilate these substances, especially sulphur, and carry them to the foliage or fruit for preventive or any other purpose. Boring and plugging—like any other threatened death to the tree—may cause temporary fruitfulness, as also will girdling.

While several washes are claimed to prevent or destroy borers, the large majority of extensive orchardists believe the knife and a hooked wire in the hands of a thoroughgoing employe the best and surest way of knowing that you destroy the larva of this persistent and destructive insect.

Smearing trees with any undiluted grease, especially axle grease made from petroleum refuse, is hazardous, and the man who advises it is an enemy to your orchard. If you have applied it, the sooner you wash it off the longer will your orchard thrive.

Pruning has its advocates, but the Eastern style of a long stem has scarcely a follower in our state; a great majority simply cut out "watersprouts" and limbs that cross or rub, or are wind-broken.

Thinning on the trees has many advocates, but few followers. All admit it would often improve the size and quality, yet most growers believe the difference would not be sufficient to pay for the labor, and it would require skilled labor to do it without injury.

A large number, perhaps a majority, believe it pays to apply fertilizers, more especially barn-yard litter, to the orchard; but cases are known where it has done much harm. All agree that it should be kept away from the body of the tree.

As to pasturing the orchard, some think it pays; others that it does no harm; others still—and they are many—condemn it. The larger proportion of those who pasture confine the stock to calves, colts, and pigs. Some would allow only poultry in the orchard, and the poultry must not roost in the trees. This latter point is an excellent one.

We find we have plenty of insects; this is natural. Insects settle in a country that provides proper food for them and their larva. As apple trees are planted in new localities the insects that delight in apple-tree wood, apple-tree roots, apple-tree foliage and apple-tree fruits immigrate, grow, and multiply.

Spraying or using some preventive or destroyer has become necessary, and the man who believes it unnecessary and intends to trust to nature or providence or God will find no truer saying than "God helps those who help themselves." Sit down calmly and watch the worms eat your trees; trust to the woodpecker and the sparrows, and you will in time buy apples from your more active, thoroughgoing neighbor, or go without.

Methods of picking do not vary much, yet all agree that it should be done carefully. If shaken from the tree, poured out carelessly, or jolted about in a lumber wagon, it simply increases the culls and decreases the cash returns.

Sorting is done in various ways (a sorting table or device is explained elsewhere), but a majority seem to make three classes: First class, the unblemished best of each variety; culls, which are the unmarketable, specked, bruised and gnarled fruit; second class, which are between the other two, and really

valuable for immediate use. In some cases the "second best" have been put in cold storage, and they sold well after the usual fall glut.

Packing: While there are many who handle in a small way in boxes—and the time is near when all fancy apples will be marketed in boxes—yet all the larger growers use barrels, and it is encouraging to find they use full twelve-peck barrels. The eleven-peck barrels should be boycotted out of existence.

Marketing: In our large apple-growing districts the crop is generally wholesaled, either in the orchard or subject to delivery at the railroad, generally in barrels. In the western half of the state the apples are largely taken in bulk, in wagons, hauled farther west and south, and sold at a good profit to the wagoner. Thousands of wagon-loads are thus disposed of every year. The same wagons often appear in the same neighborhood year after year, to the mutual advantage of all. Shipping to distant markets by the growers, especially when consigned, has been generally unsatisfactory. I need not give reasons; my own experience along similar lines makes me "hot under the hat" when I think over it.

Drying is not practiced to the extent that it ought to be. It seems almost a sin to allow so many thousands of bushels of apples to rot on the ground every year simply because the owner lacks faith in his ability to turn them into a product that will keep while he looks up a market. Dried apples are in demand—hundreds of tons of them—and Kansas dried apples stand as good chances to bring as remunerative prices to the manufacturer as those from other states. If the work is economically done a profit is sure. Storing for winter is described elsewhere.

Cold storage, cave storage, and cellar storage: All know that, after the perishable and inferior apples are gone, good winter apples bring sure and large returns. How best to preserve them is a vital question. The art of keeping apples by the artificial cold-storage process is yet imperfect and unsatisfactory, and the losses have been so great that, unless the owner of the plant will take part of the risk, at least to the extent of his fee, he will find the average grower standing back. To lose your apples, and then pay fifty cents per barrel to the man whose ignorance or carelessness may have caused the loss, is a burden too heavy to be borne. The hillside cave is described elsewhere, and the orchardist who has such a cave well built, and gives it careful attention, will save a large portion of the fee, and have his apples always under his own supervision, besides saving in hauling, and perhaps railroad freight to and from a distant cold-storage plant. House cellars, small caves and buried heaps each and all have their advocates, mostly for family use or among the small growers.

It seems to be determined that the Winesap is the better keeper, followed closely by the Missouri Pippin and Ben Davis. Of less marketable varieties, Rawle's Janet and Rambo seem to keep best. The per cent. of loss, excepting in a few cases, does not seem great considering the (usually) greatly increased value of the sound apples.

The reports from those who irrigate are not as full as we could wish. It is claimed that with irrigation every apple becomes a perfect specimen of its kind; that there are no culls. If this is so, and we hope it is, what a grand opening for those rightly situated.

Our Lakin correspondent sells his apples at top prices at the tree for cash, to men who could but do not heed the injunction, "Go thou and do likewise." Prices, like wages, vary greatly. Apples put on board cars in a northeastern county at twenty cents per bushel often retail in western groceries at one dollar per bushel. The railroad and grocer get the "lion's share."

On the whole, a close study of all that is in this book ought to give an im-

petus to the planting of proper varieties, the careful and complete destruction of insects, the growing, picking, packing and marketing of more profitable apples, all to the glory of the Kansas grower and incidentally swelling his bank account. This means better dwellings, better furniture therein, better food on the tables, better education for the children, and more and better literature in the house. If these aims are realized, then the labor of the compiler shall not have been in vain, but will prove to be a help in making Kansas and the Kansas apple known throughout the whole world.

MISCELLANEOUS ARTICLES RELATING TO ORCHARDS.

APPLE CULTURE.

A paper read by JACOB GOOD, of Coffeyville, Kan., before the Kansas State Horticultural Society, at a summer meeting in Coffeyville, June 22, 1898.

Beginning in the early Roman period, the apple has been handed down through the successive ages as the standard fruit. True, the hard, bitter, uneatable crab or wild apple of former times was not much like the tempting apple of to-day; yet it is the parent of all, or nearly all, the varieties of apples so much prized at the present time. From its great hardiness, easy cultivation, and long continuance through the whole twelve months, it may be styled the "king" of all fruits. The apple tree is now one of the most widely diffused of fruit-trees, and in the estimation of many is the most valuable. But what has brought about this great change in tree and fruit? The same cause which makes the man of America or Europe superior to the tribes of northern Africa or India. The same cause by which the most wonderful inventions of any age have been placed before the public, viz., cultivation and constant attention. Having made these questions a study for twenty-five years or more, and having gathered all the points possible from the experience of the fruit-growers with whom we have come in contact, we have become thoroughly convinced that the growth of a perfect fruit is possible in this climate. One of the main difficulties in a general fruit-growing business is encountered in a hard subsoil—too hard when it is dry and too soft and yielding when wet. Deep and thorough draining is therefore a great requisite in tree culture.

The next step would be the means for securing plenty of moisture. We would first open trenches each way not less than twenty-five feet apart. They should be thrown out as deep as can be done with a plow, then followed by subsoiler twelve to eighteen inches deep. Draw the surface earth back into the crosses creating a mound. Plant the trees there and fill up the ditches by back-furrowing, and bring the land to a perfect level. It will not pay to plant trees on hard-pan soil without preparation. It is better to avoid the hard-pan altogether, and select a deep, rich subsoil. Trees planted in river bottoms have been known to be vigorous and productive after twenty-five years; while those on the prairie hard-pan planted at the same time have entirely disappeared. The best time for planting is in November, in order that the fiber roots may be ready for the first warm days of February. Nice, healthy trees, from two to three years old, should be selected; cut the tops back and trim off most of the fiber roots. The reason for cutting the tops back is to make the tree more productive, more easily harvested, and to aid in keeping off the tree borers, of which we will speak later. Our orchards should not be allowed to grow up in waste and neglect, neither should they be planted in those things which sap the life of the soil and leave nothing to sustain the tree. One of the main causes of non-productiveness of the apple orchard is land starvation. An orchard cannot produce fruit in addition to a crop of wheat, oats, rye, etc.; and so, if a man continues to take off crops of these every year, he simply does it at the expenss of his trees. There are crops, however, which may be used with good effect, such as corn, peas, hay, potatoes, etc. In this the owner gets the profit of his fruit and also the

use of his land. Yet, with all our care of the soil, minuteness in following directions as to setting out and trimming, etc., there are other difficulties still to overcome.

Many kinds of insects may infest the trunks and larger branches of the trees. Among them are the apple-tree louse, round- and flathead borers, San Jose scale, canker-worm, tent-caterpillar, etc. I would name the borers and San Jose scale [None yet found in the state.—SEC.] as being the worst of the pests with which to contend. The borers attack the trunks and larger limbs of the trees; they seek the sunny side of the tree, not being found where the sap is abundant or where there is a continual shade. Under the first they drown, and under the last they weaken and die. This is a strong argument in favor of low heading and shady growth of the trees. The parent of the borer, a long, green or pale brown beetle, may be caught and destroyed, but it is not to be presumed that all the beetles can be caught; it becomes necessary to examine the trees quite often, in order to destroy the worms hatched from the eggs of the uncaptured beetles. To detect the spots which indicate the whereabouts of these worms is, to the inexperienced, quite a difficult undertaking; for during the spring, and until quite late in the summer, there are no external marks save a small speck, or perhaps a dark blue line so fine that it will not attract the attention of those not understanding the cause. When they are first detected a sharp knife may be used to remove them, but if they have entered the wood, about the only way of removing them is by means of a probe made of common broom wire, with which to thrust them through or drag them out of their holes.

The San Jose scale, a native of Australia, was first found on the American continent in California in 1873. It has not troubled Kansas yet, but it is quite prevalent in the Western States, and, as it spreads rapidly, it is much feared. Its detection is almost the work of a specialist, yet there are a few general characteristics which may be detected by the naked eye; for instance, the bark of the tree loses its vigorous, healthy appearance, and takes on a rough, gray, scurfy deposit. As yet I have heard of no permanent cure. Spraying has a great deal to do with keeping off the insects—of which the canker-worm is getting to be one of the worst—from the upper branches of the trees. It is a mistake to think that a tree should not be sprayed because it has not been infested by any insect or fungous growth. The attacks of both are often unnoticed at first, and the man who is not prepared for them often neglects spraying until it is too late to save the crop of that year.

My experience in regard to the varieties of apples grown has been quite varied. My first orchard, in 1871, did well; I took great pains in setting it out, and for five years there were none of the injurious insects which make us so much trouble. In my second orchard, ten years later, I made great mistakes in the varieties I chose, some of them not being adapted to either soil or climate. By the time I set my third orchard, six years from then, my experience had taught me that the varieties which were best for home and commercial purposes, and which were best adapted to both the soil and climate, were the Ben Davis, Missouri Pippin, and Mother, and in these varieties I planted most of my orchard. The habits of the Ben Davis and Missouri Pippin are too well known to need further description. In my orchard I found them both short-lived. My Ben Davis began to die out at twenty years, and a very few reached the age of twenty-six. The Mother is an apple not so well known. It originated at Bolton, Mass. Tree is moderately vigorous, upright, and productive; one of the best apples on the list there, and I consider it equally so here. Thomas, the American fruit culturist, in his description of the apple, says it is rather large, oblong, ovate, approaching

conical; slightly and obtusely ribbed; color a light, warm, rich red, on a yellow ground; moderately juicy, rich, very mild subacid, with a mixture of sweet. Growth slow; late autumnal and early winter. However, it ripens earlier in this climate; follows the Maiden's Blush. Downing says no orchard is complete without it.

While the Ben Davis, Missouri Pippin and Mother are my favorites for productiveness, we have other varieties that are quite productive and long-lived trees, such as the Early Margaret or Striped June, that is an annual and profuse bearer and one of our earliest. Duchess of Oldenburg has never failed with me. Maiden's Blush has given good success. We have the Romanite, Rawle's Janet and Limber Twig that are good keepers, but owing to size are not desirable for home use or market. I find more complaint of the Ben Davis than any other apple, though its beauty invariably causes it to sell. My greatest mistake in planting was in selecting Rhode Island Greening and Nonsuch, which have proven almost non-bearers. The trees are healthy and grow almost like an elm or oak. A number of varieties, such as the Mammoth Black Twig, Arkansas Black, Muklen, Rome Beauty, I have not fruited, and cannot tell as to their qualities in this locality. In all my experience in the apple line I find that no orchard will grow and bear without attention, and constant attention at that. The apple tree requires as much interest from its owner as cattle do from the stock-raiser. From a tiny seed, it is subject to disease and pests which, if not destroyed, will destroy it. I would say in conclusion that success in apple raising comes only through eternal vigilance.

ORCHARD CULTURE.

By JAMES McNICOL, Lost Springs, Marion county, Kansas.

Orchard culture being my subject, of course the varieties of trees are supposed to be carefully selected and planted; but the distance apart is important. If too close, no matter how thorough the cultivation, they will suffer for moisture; and if too wide apart the winds will play havoc with the trees and fruit. What is best for this locality, to break the prevailing south winds and yet have plenty of space for the roots to find moisture? Is it better to plant closely north and south or east and west? I would prefer close rows running east and west, as each row would help break the wind when the trees in the row reached each other—then how close in the row and how far apart the rows? I would plant the trees twenty feet apart in the rows and the rows thirty feet apart. I would like to recommend planting a row of cherry, dwarf pear, plum or peach between each apple row, provided they are cut out when they rob each other of moisture.

Eternal vigilance is the price of fruit, but, in central Kansas, to eternal vigilance you must add thorough cultivation. For a few years cultivated crops may be grown, leaving a good space next to the trees to be cultivated—not to grow up in weeds. Do not, like one of my neighbors, cultivate the corn row, that cost only about five cents a row for seed, four times, and leave the tree row, which cost two dollars per row, uncultivated. Do not use a stirring plow; it will hill up earth around the trees too much. With a lister you can list in your corn or furrow out potato rows, running east and west one year, and north and south the next. Growing crops for five or six years is long enough; then cultivation should be done with a disc, an Acme or a common harrow; I prefer a reversible disc.

Acme is all right if you do not let the weeds get the start of you (which you should never do, but you will sometimes); then the disc is the implement.

Whatever tool you use keep it a going, east, west, and diagonal, and when blessed with a good rain through the summer don't wait till the weeds get started, but cultivate as soon as dry enough to form a dust mulch. Few seem to know the value of a dust mulch. A high state of cultivation can be kept up in the orchard with what implements the farmer has. Use the one horse, five-tooth cultivator close to the trees, and the two-horse cultivator for the middle, going both ways; then pulverize with the harrow; use the harrow often. Six days' work at the proper time will keep a five-acre orchard in good shape the whole season. "But," says some one, "it does n't pay; this is not a fruit country." No, it is no fruit country, and never will be, to the one who has no time to cultivate; but to the one that will there is a big reward, for the very reason that it is not a fruit country.

ORCHARD TREATMENT.

A paper read before the Kansas Horticultural Society, by W. D. CELLAR, of Edwardsville, Kan.

A wide difference of opinion prevails as to the proper distance apart for apple trees, some growers maintaining that forty feet is close enough, while others plant as close as fifteen feet. With varieties that come into bearing early, planting close in the row north and south, with the intention of cutting out every other tree when they are large enough to crowd, may be good husbandry. Two or three crops might be secured before it would be necessary to cut out the extra trees. The objections are, that the orchard cannot be so thoroughly cultivated, and the drain necessary to grow the extra trees might so debilitate the soil as to seriously affect succeeding crops. One grower says: "I am satisfied it will pay in the short run, but it remains to be seen whether it will pay in the long run." In this section, where we have so much wind and sunshine, twenty-five to thirty feet seems to be the proper distance for apple trees, fifteen feet for plums, and fifteen by twenty feet for peach and cherry, and twenty feet for pear trees. Upland is thought better than river bottom for orchards, and a north or east slope is chosen for apples.

A difference in location is required for different varieties of apples. A vigorous-growing variety will do well on the thin soil of the hills, while a variety deficient in root vigor, which might be profitable in deep soil, would not thrive on the hilltops. I gathered this year from eight-year-old Missouri Pippin trees, planted in the deep soil of a creek bottom, five bushels of apples to the tree, while Missouri Pippins in the same orchard, on the hilltops, planted at the same time and having the same treatment, yielded scarcely a bushel to the tree. In the same orchard Jonathans yielded about as well on the hill as in the valley. I would not choose an exposed north or northwest slope for peaches or cherries. Better an east, or even a south slope. Professor Whitten, of the Missouri State Agricultural College, has recommended whitening peach trees in winter by spraying with lime to prevent premature swelling of the buds.

In my locality the best varieties of apples, from a commercial standpoint, are Ben Davis, Jonathan, and Missouri Pippin. More Kieffer and Duchess pears are planted than any other kind. The leading peaches are Elberta, Old Mixon Free, Stump, Champion, Smock, and Salway. The most profitable plum is the Wild Goose. Some of the Japans, Abundance and Burbank promise well. Of cherries, Dyehouse, Early Richmond, Montmorency, English Morello and Ostheim

make a succession in the order named, and are the best for either a family or commercial orchard.

Cultivation of the orchard for the first few years is deemed absolutely necessary to success, but it is a serious problem how to cultivate the hills, and at the same time keep them from washing into the hollows and so denuding the roots of the trees at the top. I know one orchard in which a back furrow has been thrown to each tree row in the same direction for several years, leaving a dead furrow (which has become a ditch) between the rows. It looks like a field of huge sweet-potato rows, with the trees standing on tripods or "quadrapeds" at the top of the ridges. Neither back furrow nor dead furrow should be made in the tree row. As few dead furrows as possible should be left. They should be frequently changed, and should never run up and down the hill. If ditches have started, they cannot be stopped by plowing them full of earth; the loose soil will wash out at the first rain. Fill them with old hay, straw, stalks, or brush. Old raspberry or blackberry canes are excellent for this purpose. Begin at the bottom and work up the hill, letting the forkfuls overlap like shingles. Drive a stake through at frequent intervals, and secure firmly at the top; else a hard freshet will wash it all out. Deep ditches may be filled by dams of loose stone a rod or two apart. On many farms these stones need to be gathered anyway, and one may "kill two birds with one stone" by filling a big ditch with a good many stones. "An ounce of prevention, however, is worth a pound of cure," and the best prevention from washing that I know of is clover. I would advise seeding a hill orchard as soon as the trees have had a year or two of vigorous growth. The orchard may be cultivated after the spring rains, and seeded again in time to prevent washing the next winter. After the orchard is seven or eight years old, I should leave it in clover and weeds, mowing two or three times a year to make a mulch and prevent tall growth of weeds.

"Hogs in the orchard" is generally condemned. I have seen old orchards, however, that were decidedly benefited by hogs. Hogs and plums go together. This is no theory, but an established fact. Let them rub the trees as much as they will; let them tramp the ground till it is as bare and as hard as the road. It will do no harm; it will do good. Hogs may not like green apples, but there is something specially delectable to a hog in a green, wormy plum. He will pick up every one that drops, and so diminish the crop of curculio. In my locality, pruning of apple and cherry orchards is practiced very sparingly. Cutting out broken, decayed and interlacing branches and the suckers at the base seems to be about all the pruning that is desirable. Peach and plum orchards are likewise neglected, though some growers practice heading in to make the trees grow more compact, and to thin the fruit. I think that, with tall and straggling apple-trees, such as Missouri Pippin, Winesap, or Minkler, heading in might be profitably practiced.

The question as to the profit of spraying for insects and fungi, as far as my observation goes, is not settled yet. The theory is all right—indeed, it has become one of the strongest articles of faith in the horticulturist's creed. When the subject comes up in the horticultural meeting all commend it. Very few growers, however, make a business of spraying. Most of the growers in my locality who used to spray have quit it. They deny that they have lost faith in it, but they do n't do it. My opinion, based not on my own experience, but the practice—or rather lack of practice—of others, is that, save in exceptional cases, it does n't pay; that the ravages of codling-moth and curculio are not appreciably lessened by spraying; that the loss from scab in this dry climate is so light as not to justify the cost of spraying; that, just as many of the doctrines of the

churchmen would die out if the preachers should turn teachers, so the doctrine of spraying as a cure-all would die out if the pump men and experimenters should turn fruit-growers; that the average man believes in a perfunctory way many things which his experience forbids him to practice.

The damage from borers is a serious drawback to orcharding. There are various patent contrivances and washes that are recommended to prevent the work of borers, but all, so far as my observation goes, fall short of complete success. The only safe way is to hunt the borers out. This should be done twice a year, late in August, when the newly hatched ones are large enough to be easily seen, and in April or May, after they have come up out of the roots, to get the ones overlooked in the fall.

Rabbits the past year have been specially troublesome. In my locality they frequently attack large trees, six to ten inches in diameter, and, in some instances, entirely destroy them. Their mischief for the most part, however, is confined to young orchards, and may be prevented by wrapping the trees with grass, stalks, paper, or, better than anything else, wooden wrappers made especially for the purpose. These wrappers are now manufactured in Kansas City. They cost about one-third of a cent each, are easily put on, and last four or five years. They are said to protect the tree from sun-scald and borer also, but I would not rely on them as a protection from borers, but would remove them and hunt the borers at least once a year.

PICKING AND PACKING.

Description of sorting table used by D. S. HAINES, Edwardsville, Wyandotte county, Kansas.

Our packing-house is on hilly land, and it is considerable trouble to haul apples to it. My packer now sorts and packs right in the orchard, using a sorting table. This table stands say three feet high and ten feet long, and three and one-half feet wide, with a common six-inch board on edge on the side. The men in picking use a ladder twelve to eighteen feet long. We did wrong in making our ladders; we could have bought them already made that were lighter and just the right thing. We set this sorting table among the trees; the men fill their sacks, emptying them on this table, which is carpeted; they barrel the apples up beside this table by letting them through an opening into a barrel. An apron is so arranged as to let the apples fall on it, and gently roll into the barrel without bruising. A man heads the barrels as soon as packed. In packing apples in the field we found that something solid was needed upon which to shake the barrels. The man who fills the barrels shakes them to make them more solid; then when pressed they bruise less. Our man can head about 100 barrels a day. In our rough country it is a great advantage to sort and pack in the orchard. We move this table about in the orchard. The expense to pick and pack a barrel of apples is about twenty cents.

A PICKING SACK.

Description of one used by FRED WELLHOUSE.

We usually pick two rows of apples at a time, using gangs of twelve men with a foreman. We cannot use more to advantage. Each man has a common grain sack with a leather fastened to the bottom, as used in sowing grain. These picking sacks are made by taking a strong two-bushel grain sack. Sew a leather strap six inches long and four inches wide to a bottom corner of the sack. On

the loose end of this strap fasten a strong metallic hook. To the upper corner on same side of sack fasten a strong metallic ring or link. Opposite this ring fasten with rivets a piece of iron six or eight inches long and about half an inch wide and one-eighth an inch thick, rounded, across the sack mouth at the edge to hold the sack open. This sack is worn under the left arm, the strap going over the right shoulder and hooking in front. We use ladders from twelve to sixteen feet long. The top of the ladder is made narrow so it can be put between the limbs, being just wide enough at top to set one foot on at a time. The apples are picked and put in bushel boxes on a platform on a wagon. The boxes are sixteen inches wide, twenty-four inches long, and eight inches deep, holding about a bushel, sixteen to a wagon.

A DISCUSSION ON PACKAGES.

EDWIN SNYDER, Jefferson county: I want to say something about marking packages. I had a nice crop of Jonathan apples; expert men barreled them for me, and put my address on the end of the barrel, outside. The commission man just took his little knife and raked it [the address] off. It is policy to put your name on [packages] if going to a wholesaler, but not to a commission house. I know economy pays in handling fruits, from packing to marketing. I should think boxes better [than barrels]. We have had trouble with barrel hoops breaking. I do not believe it best to sort too closely. If you put first-class apples on top, and second-class on the bottom, your customers expect to find the best on top and worst on bottom.

B. F. SMITH: I have been in Kansas City, and never saw a name scratched off a barrel yet. In grading strawberries, give each picker six boxes in a tray; have them fill three with large berries and three with medium size [impracticable]; allow no inferior or small ones put in.

A MEMBER: About fifty per cent. of our fruit, especially apples, is not readily marketed. Can we possibly handle this fifty per cent. so as to make it pay the expense of handling the better part of the fruit?

EDWIN TAYLOR: If the culls are fifty per cent. of the crop, it is not difficult to make them pay for handling the entire crop. This year the culls would readily sell at fifteen cents in the orchard. Last year there was no trouble to sell "down apples" for ten cents in the orchard. The cost of packing is slightly more or less than fifteen cents a barrel. If your apples are scattered, more; if near together, less.

DR. G. BOHRER: Would it not pay better to work them [the culls] into cider and vinegar?

EDWIN TAYLOR: No, sir. I had rather they would rot on the ground than be made into cider.

A MEMBER: Our second grade brought forty cents a crate; the best, sixty cents. It pays me best to mix them. I ship to Kansas City, and they handle my fruit with success.

H. L. FERRIS: This year I sent a Minnesota man a car-load of very small Winesap and Missouri Pippin apples, such as we use for making cider, in exchange for potatoes. I sold part of the potatoes at seventy-five cents and eighty cents, and some are in the cellar.

GEO. VAN HOUTEN: In our state [Iowa] we are most successful in handling apples in barrels. For a small trade, bushel boxes made of light material may serve better. Many car-loads are sent out in eight-pound baskets.

HOGS IN THE ORCHARD.

QUESTION: *Does swine grazing injure orchards?*

J. W. ROBISON: Not if the hogs are kept out of it. It is death to an orchard to let hogs in. To let them rub against the trees closes the pores, and growth ceases. We notice in the newspapers that fish oil, axle grease, etc., keep off rabbits. I tried using axle grease two years. You could see the mark around where the oil had been, and note where growth had stopped below this mark. By washing this with soap, we were enabled to get the trees to grow again. Hogs, as I stated before, will, by rubbing, close the pores. The tramping hardens the soil and shuts out any percolation of water into it. As well plant a tree in the middle of the road as where hogs have been. They, of all animals, tramp the ground the hardest.

SAMUEL REYNOLDS: Would pigs injure the soil?

T. A. STANLEY: I have had experience in this, yet, while I do not know anything about the gentleman's land packing, I believe it benefits some orchards to run hogs in them. I tried it on an orchard that had ceased bearing. I inclosed the orchard and put hogs in for a year or more. New growth started on the trees, and they at once began to bear, and bore for several years after I took the hogs out. I could see no injury caused by their rubbing the trees. I do not think they will rub the trees if the orchard is large. I do not see what injury they do. After the apples grew large enough, if wormy they fell, and the hogs ate the apples and the worms also.

EDWIN TAYLOR: I have had a little experience in that line. I fenced around a twenty-acre orchard, expecting to combine horticulture and agriculture right there. My hogs were lousy, and they did rub the trees, and whenever they rub they destroy. Anybody who tries it will find they will absolutely squeal for something to eat when there are bushels of apples on the ground. I was at large expense to fence, but was so disappointed with the hog business that I took the fence down.

COLD STORAGE.

By GEO. RICHARDSON, of Leavenworth, Kan.

It has been well said that "Necessity is the mother of invention." Cold storage of the present time is understood as "mechanical refrigeration," and in general, the preservation of perishable articles by means of low temperature, hence, the act of reducing the temperature of any body, or maintaining the same below the temperature of the atmosphere, is called refrigeration, or more familiarly known as cold storage, produced by the employment of machinery of various types. Of those mostly in use, are the compression system, using anhydrous ammonia as a refrigerant, by expanding the ammonia either directly through coils of pipe arranged in the storage rooms, or through coils of pipe that are submerged in salt brine, where the brine is reduced to a low temperature and then forced and circulated through pipes in the storage rooms, one being known as direct expansion, the other, brine circulation, but both accomplish same results.

To utilize anhydrous ammonia requires complicated and expensive machinery, and to those not acquainted with the subject it may seem strange that more units of heat are produced by the burning of coal, wood or oil than there are units of cold produced to reduce the temperature of storage rooms.

Of the uses and benefits of cold storage it can be truthfully stated, that nothing in recent years has been of more direct benefit to the farmer, stock-raiser, and fruit-grower. But a brief period has passed since cellars, caves and underground grottos served as the best means, and in a limited way under certain conditions of weather, for the protection and preservation of perishable articles.

To-day machinery has made it possible to control temperature at any degree and in all climates. The burning heat under the equator would not be an impediment to secure a zero temperature in a cold-storage room.

The construction and successful operation of the mammoth packing-houses are the outgrowth of the success of the application of mechanical refrigeration, where any day of the year a market is made for live stock. But few years have elapsed since the vast herds of South American cattle had no value, except for their hides, horns, and tallow, and the great bands of Australian sheep for their wool. Now immense refrigerating plants are in operation, freezing the beef and mutton, with fleets of ocean steamers equipped with refrigerating machinery and storage rooms filled with frozen meat for European markets. From the United States the dressed-beef traffic is of large proportions. Storage speculators are always ready buyers at remunerative prices for butter and eggs, that in value exceed the great wheat crop of America.

To fruit-growers, especially those engaged in apple culture, cold storage is attracting more than common interest, as it has been demonstrated a grand success in the preservation of apples from three to six months longer, in good condition, than in natural storage that is subject to the changeable influences of the atmosphere. At the same time, the apples retain their original and individual flavor, color, and crispness.

Cold storage, or mechanical refrigeration, arrests fermentation and decay, or, better stated, prolongs the life and keeping qualities.

Of the advantages gained, it offers a place of safe-keeping for future market, and affords a protection for the grower if market conditions are not favorable; such as an overstocked market, consequently low prices, caused largely and influenced by many other varieties of fruit that are in season while the apple crop is being gathered.

Again, the fact of the existence of cold-storage houses has brought into the field speculators, which has a wholesome influence, and oftentimes strengthens the markets and lessens the quantity that would of necessity be forced on sale at an earlier period at a great sacrifice, which is the situation this year, where the enormous crops of New York, New England and Michigan apples are being sold at from fifty to seventy-five cents a barrel (including barrels) placed aboard cars, for the want of proper and sufficient storage facilities to relieve part of the burden. No such condition or low price has yet been felt by the Western grower.

There may be years when the buyers will look far into the future and think they can see visions of long prices, when it would be wise for the growers to sell, as there is some risk to be taken as to future markets being lower than prices in the fall, but such is not the rule.

From six years' experience with mechanical refrigeration and the storage of Western-grown apples, there has not been a year but what a profit has been shown over and above the cost of storage, insurance, and minor incidental charges. One of the first to make the experiment, and who have been patrons of Ryan & Richardson's cold storage, at Leavenworth, since the plant was erected, were Wellhouse & Son, the largest apple growers in the United States, and the records show a net profit of from fifty cents a barrel, as the lowest of any year, to as high as \$1.50 other years. It is gratifying to state that, in all the years, not a single

car-load was rejected when sold. Much of the success must be given credit to the grower who gathers his crop at the right time, in a careful manner, graded and packed according to the requirements of the trade. Then, if the cold storage to which he intrusts the care of his crop uses the same watchfulness as to necessary temperature, proper ventilation at the right time, the result usually will be gratifying and remunerative to both.

A FRUIT DRYER.

The dryers used by Wellhouse & Son are made as follows: A rough building eighteen feet square and sixteen feet to the eaves is built. In building the roof, a lantern or ventilator is built along the ridge, over an opening in the ridge two feet wide. At eight feet from the ground is built a slatted floor. The timbers [?] upon which this floor is laid are best made of one-inch boards, ten to twelve inches wide, placed only ten or twelve inches apart. The floor slats are best made of poplar, as pine often flavors the fruit. They are sawn from inch lumber one and one-half inches on one face and one and one-quarter inches on the other face. The slats are nailed to the floor joists [?] with the wide faces uppermost and about one eighth to three-sixteenths of an inch apart, thus making the crevices wider below, which, together with the narrowness of the floor joists [?], allows free circulation and prevents clogging. The lower floor is of earth, cinders, stone, or other material. On each side, near the ground, are two openings, each two feet square, with shutters to close them; these are to admit fresh air, and can be closed to regulate draft. A chimney is built up through the center of the building, out through the roof. A door is made to each floor; in front of the upper door is built a balcony reached by outside stairs. This completes the dryer.

It may be used for storing hay, fodder, tools, etc., after the drying season is over. The upper floor might be made removable. Many farmers have a suitable building if the slatted floor is added. Any kind of a wood or coal stove (or a brick furnace) is placed in the lower room and a good heat kept up; maximum 150 degrees. The prepared fruit is simply spread evenly upon the slatted floor from four to twelve inches deep. Fire must be continuous, and a dryer eighteen feet square will dry 100 bushels in twenty-four hours.

Bleaching is done as follows: An upright box about two feet square and twelve feet long is built outside against the balcony. A set of trays are made to fit it; these trays have bottoms of galvanized-wire screening. A pot of sulphur is kept burning on the ground under the center of said box, the apples, peeled and cored, are placed in the tray and the tray slid in above the sulphur. An endless chain mechanism moves the tray up ten to twelve inches and another goes in; as they come to the top an employee removes them and runs the fruit through a slicer and then spreads it out on the drying floor. In twenty-four hours the product will be dry, but not alike; they are then piled up under cover, and pass through a sweat, making them alike throughout. As soon as cool they are packed, and pressed into boxes for shipment. This dryer costs but little, and the building may be used eight to ten months of the year for any cleanly purpose. President Wellhouse has six of these dryers in a row in one of his orchards. A single bleacher answers for several dryers.

THE MOYER FRUIT EVAPORATOR.

Bill of lumber for dry-house: Four pieces 2x4, 10 feet long; flooring, 150 feet; 1x1 strips, for trays, 400 feet, lineal measure; 1x2, 47 feet, lineal measure; 1x4, for tray rest in center, 47 feet, lineal measure.

How to build and operate: For the house or box part, take four pieces of 2x4, 56 inches long, and four pieces 2x4, 37½ inches long; nail together with the short pieces on the inside, lapping the long ones on the end of the shorter—thus making a frame 52x37½ on the inside. This makes the sills and plates. Close three sides of this with matched flooring, up and down, seven feet high; now you have a box seven feet high; 52x37½ inches. Leave the one side open to be closed with four doors similar to double stable doors, and in the exact center of this door space nail a 1x2 inch piece up and down to nail tray rest to. This will give two rows of trays.

Put comb roof on with the flooring, leaving a vent open at comb two inches the entire length of box. Make a V trough, which turn upside down with one inch blocks under the corners; this gives ventilation and also keeps out the rain; also make two six-inch holes below, to be opened or closed as needed; this admits cold air and drives the hot air up, causing complete draft. When the evaporator is full of fruit, the holes below should be open full size, except at night, when fruit is nearly dried, they should be closed, or partly so, which is done by tacking a small piece of board over hole, which can be pushed to one side and a nail or screw hold it in place. For the trays to rest on, take a piece 1x4, 37½ inches long, nail a two-inch piece of same length in center of this, on top; this gives one inch on each side for rabbet; this is for center, and the rabbet rest is nailed to it through the 1x2 inch in front, and through the siding on rear side. For the outside rabbet, one piece 1x1 inch, 37½ long; this nailed to the end of the box forms rabbet for the trays to rest on. As many of these tray rests can be made as needed to fill the box to near the top of doors. Place the first ones twelve inches from bottom of box, and continue up, placing them three and one-half inches apart. The trays are made of 1x1 inch strips for the frame part, and are 2x3 feet square; bottom is made of plastering lath sawed in two, and also cut in two lengthwise, as they are too wide; nail these to bottom of frame, three-sixteenths of an inch apart. When used for berries or sweet corn, tack cheese cloth stretched tightly over the lath. There should be four doors, in order to have as small a space open as possible in attending to the fruit; these are hung by light hinges to outside and fastened by a wooden button screwed to center upright. The lumber can all be bought at planer ready for use cheaper than it can be cut by hand.

For the furnace, build a box of brick or stone as large on the inside as the house, letting the most of the wall extend on the outside, in order to have all the space possible inside, for heating. Build into this wall at the bottom and ends a piece of heavy stack or sheet iron; any old smoke-stack will do, but must be at least one foot in diameter: if smoke-stack is used, split it and spread as much as possible, to have large enough place for fire and all the heating surface possible. This open edge of iron must be well plastered down with mortar, or brick and mortar, that no smoke may get inside. Let it extend just through the wall to a flue built at the end on the outside, of brick or stone, as high or a little higher than the wall; then a common six-inch stovepipe set on, to run as high as the evaporator, will do. A damper in pipe is an advantage to check draft and control heat, and pipe should be at least one foot from evaporator.

The mouth of furnace should be at same end as the ventilator holes in the evaporator, and can be closed by a piece of sheet iron with a small draft underneath, the same as a stove door.

Set your box evaporator on this wall, and mud or plaster it down tight. In using, always have your house well heated before putting in fruit. The top of wall must be fully one foot above top of iron; this will make two feet space from iron to first tray. In putting the trays in, shove the first one clear back, let second be flush in front, the third clear back again—placing them the same in both sides; this sends the heated air directly over each tray to the top.

A MISSOURI APPLE HOUSE.

The property of Col. J. C. Evans, Harlem, Mo., president of Missouri State Horticultural Society. Dimensions: Length, 200 feet; width, 46 feet; depth, 11 feet; earth bank, $5\frac{1}{2}$ feet thick. Capacity, 15,000 barrels. Cost, \$1,000 and eighty-five loads of sawdust. Double floor overhead, with eight inches of sawdust between. Roof projects three feet all round. Ground slopes away rapidly, to carry away water. Winter entrance through anteroom 12x12. Driveway twelve feet wide through whole length.

MANY WAYS OF USING CULL APPLES.

Cider: Newly made sweet cider is both pleasant and healthful, and is a useful ingredient in some culinary preparations; but it should be used fresh from the press or not more than twenty-four hours old. To make it, cut out all the rotten and bruised spots, also the worms and their burrows. To make cider or vinegar from rotten and wormy apples ought to be considered a crime. The famous Russet cider of New York is made from sound Russet apples and brings top price.

Sweet cider may be canned or bottled and will keep interminably, if heated to 160 degrees and kept hot for twenty minutes, then canned and sealed as for fruit.

Boiled cider, that is, reduced to one-fifth by boiling, and canned, is a nice article for culinary use, for making apple-butter, apple-sauce and in apple or mince pies. It would sell.

Cider vinegar is the best for home use and market. No one having an apple orchard should ever buy vinegar, and ought to have some to sell to neighbors or at the stores. To make: Sweet cider carefully made should be placed in clean, sweet, oak barrels, placed in a room where sun and frost cannot reach it. The barrels should be laid on their sides, with the open bung-hole upward, and double mosquito net or wire tacked over it. It requires from eighteen months to two years to become first class, but there is no more labor excepting to rack or siphon it off from the sediment; do not be impatient; make some every year, and if you are a "rustler" you will make good money out of it. Our home demand requires over 50,000 barrels per month.

Apple-butter, to be good, requires boiled cider, and if to the boiled cider is added the good parts of the best culls, and carefully and skilfully boiled, either with or without spices, it sells for one dollar per gallon and is very profitable.

Dried apples: The best of the culls, carefully trimmed, peeled, cored, and quartered or sliced, may be dried in the sun and air anywhere in Kansas. A cheap rack of poles or slats three or four feet above the ground, a lot of trays made of lath with muslin bottoms and plenty of mosquito netting to spread on hoops or bars above the fruit to keep off flies, are all that is needed. Do not leave them spread out during rain, or at night. The trays can be piled at night, with the fruit in them, under a shed or cover. Keep all vermin from them and stir often.

Evaporated apples sell better, and by many are preferred. [I like the sun-kissed ones the best.—SEC.] There are numerous patent evaporators, all very good; but any ingenious man can make his own. The evaporators in which the Wellhouse culls are dried are very simple. President Wellhouse says he spent over \$2,500 on patent dryers without any satisfaction, and then built his own, which are described elsewhere.

ENEMIES OF THE APPLE.*

APPLE-WORMS.

Many believe that worms are the parents of worms, and that they come suddenly, like a "wolf on the fold." A letter is received at this office telling of the sudden appearance in immense numbers of a worm that is destroying all that is before it, and wondering where they came from "so suddenly." Speaking of apple pests, the canker-worm, tent-caterpillar, the worm (larva) of the hand-maid-moth, and the apple-worm (larva of the codling-moth), they did not come (travel) from anywhere; and no difference if they cover your trees, or are like the "sands on the seashore," they were all hatched right there on your trees.

An observer looks at an apple or a nut with a hole in it, and says, "There is where the worm went in." It is directly the opposite; that is where the worm went out. He hatched from an egg, placed on, near by or just under the surface of the fruit; and eating a burrow to the core it grew large and plump, became a full-grown worm, burrowed to the surface, and passed out. When you see worms hanging in great numbers from single webs or the bole of your tree alive, with myriads of worms crawling, some up, some down, some crosswise, know of a surety that they are not going *up*, but coming *down* to Mother Earth. Insect life changes more in a day than humanity does in a year. These worms have quit feeding, and are in a nervous, uneasy, often blind and skin-tight condition, going through a change from the luxury of leaf or fruit eating to a desire and ability to burrow into a living tomb several inches below the earth's surface. These myriads of worms are doing you no harm now; they will never eat again, no matter how tempting the morsel. This shows the absurdity of bands of cotton, etc., placed about a tree when the bole is covered with worms, "to keep them from going up."

The real parents, the ones that lay the eggs and propagate their species, are usually winged moths or butterflies. A beautiful moth that you admire and will not allow your child to hurt may be the parent of the disgusting and destructive worms covering your trees or shrubs. In the following pages, we have tried in the least and simplest language to describe our commonest and most objectionable apple pests.

SPRING CANKER-WORM.

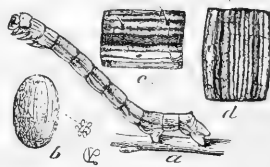
This is the worm that the amateur and the very busy man suddenly discovers in April defoliating his apple trees, and, on examination, he finds them in such myriads that he imagines some power has suddenly sown them broadcast over his orchard. See fig. 1. Had he been observant during the sunny middays of February, he would have noticed insects similar to figure 2 crawling up the bole of the tree, and looking closer, a little later, he would see small masses of eggs, shown in figures 3 and 5, glued fast, usually near the base of limbs or twigs.

* We are pleased to acknowledge our obligations for much of the following valuable information on our insect enemies and for the loan of cuts used to Prof. J. M. Stedman, of Columbia College, Mo., and Prof. E. E. Faville, of the Kansas Agricultural College.

Along early in April these eggs, warmed by the same sun that swells the buds and causes the green tips of the leaves to protrude, hatch into tiny worms looking like a dark thread snipped into bits about an eighth of an inch long. These millions of tiny worms, scarcely visible, occupy their time eating and growing, and the orchardist is possibly unaware of the army he is feeding until they grow



FIG. 1.

FIG. 2.
Adult Female.FIG. 3.
a, Eggs deposited
at base of limb.
b, Egg mass.FIG. 4.
a, Larva, or worm.
b, Cluster, and a magnified egg.

into lusty, fat worms, from one and one-eighth to one and one-fourth inches long, of a dark olive-green color, with black heads. See *a*, fig. 4. If disturbed they quickly spin a single web and fall suspended at its end, as in fig. 1. Their life, as worms, lasts only about six weeks, then they seem suddenly to have vanished. They have gone into the earth to pass into the pupa state, coming out the following spring as adults; the males with wings to fly, the female wingless, as in fig. 2, to crawl up the tree as described. Now, as these myriads of tiny worms must make the tons of grown worms entirely from the foliage on the trees in which they hatched, it is plain that the said foliage must suffer, and it will look as if scorched by fire.

Remedies. Bands smeared with sticky material put tightly around the tree bole early in February has stopped many a female from crawling up to lay her eggs. Spraying with London purple or Paris green, one pound with two pounds of lime and 150 gallons of water, is the common remedy. To be efficacious the drug must be of a normal strength, say forty-five per cent. arsenic, and as the worms grow larger and stronger the water must be lessened. When the worms are an inch or more long it may require only fifty gallons of water. Another formula is, two pounds white arsenic, four pounds sal soda, two gallons of water; boil until the arsenic is dissolved. One pint is enough for forty gallons of water. As the worms usually feed on the under side of the leaves, spraying should be from below as much as possible. "The early bird catches the worm" is true here. Therefore, spray while the worms are tiny and the foliage thin, and the work will count as the "stitch in time," destroying nine hundred and ninety-nine.

TENT-CATERPILLAR.

Nearly every one has seen the "tents" of these in neglected trees. See fig. 5. They usually betoken the too busy man—the man with too many irons in the fire. They are large, unsightly bunches of webs, closely woven together at the forks of twigs at the ends of limbs or branches. The parents of these worms are moths (see fig. 6) which appear in June each year, and deposit their eggs in clusters containing two or three hundred, surrounding small twigs. See fig. 7. Sharp eyes, a sharp knife and nimble fingers will bring many to the kitchen fire. These eggs hatch in the warm days of spring, and the tiny worms immediately seek and devour the tender buds and leaves. The day they hatch they begin to build the "tent." Those from the same mass of eggs, say 250, combine to make the home nest or tent. They come out from this tent to feed in the morning, return for a *siesta* or sleep, and emerge again in the afternoon for a second feed.



FIG. 5.
Tent with larvæ.

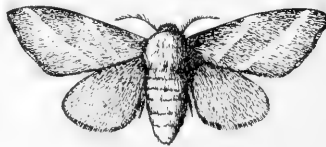


FIG. 6.
Adult.



FIG. 8.
Tent-caterpillar.



FIG. 7.

They live in this way four or five weeks, becoming, when full grown, about two inches long and nearly as large as a lead-pencil. See fig. 8. They are black, with light-colored tufts of hair on the back. Down the center of the back is a white line bordered with irregular yellowish lines. The sides of the body are marked with pale blue, while the under side of the worm is black. When grown they pass to the ground and hunt a sheltered place, where they spin a cocoon, from which, in about three weeks, emerges the adult moth, fig. 6, the color of which varies from yellowish to reddish brown. The front wings each contain two oblique, whitish lines, dividing the wing into three nearly equal parts. These moths are night flyers during the last half of June and first half of July. They eat nothing. The female lays her eggs as described, and dies.

Remedies. Spare the birds; put up boxes for the bats and owls. Cut off the egg clusters during the winter. Cut and burn the tents, or burn the tents on the tree, with any kind of a torch. Early morning or late evening is the time, as they are then all home. Spray the foliage nearest the tents with solutions for canker-worm.

CODLING-MOTH.

The apple-worm, which every apple eater has found many times in the apple, is the child of the codling-moth. See *b*, fig. 9. It is a scourge all over the apple-growing district. It destroys or reduces the value of the apple crop many millions of dollars annually.

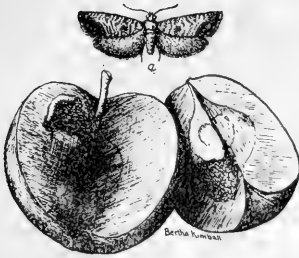


FIG. 9.
 α , Female Codling-moth.
 b , Larva of same in apple.

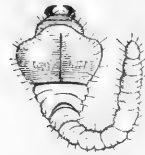


FIG. 11
Larva of a Flat-headed Borer.

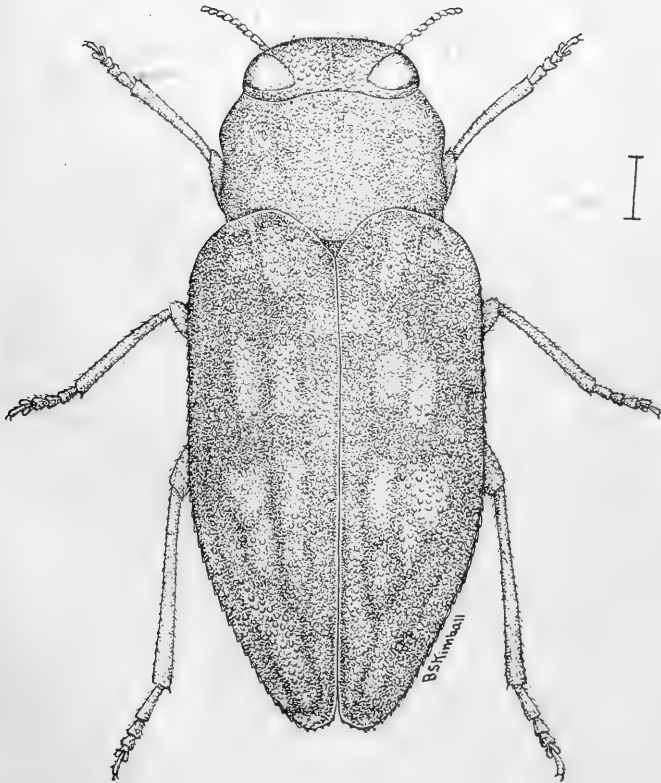


FIG. 10.
Adult Flat-headed Borer.

The parent—adult insect, or moth—see *a*, fig. 9, is a small moth with a spread of wings three-fourths of an inch, the first pair marked with wavy lines of gray and brown, with a large, oval brown spot, streaked coppery, on hinder margin. The hind wings are yellowish brown. These moths appear, and begin to lay on the surface of the leaves, in the calyx, or on the surface of the apple, about the 1st of May. The eggs hatch in about one week, and the young worm immediately begins to burrow into the apple, working its way to the center, where it works around the core, gaining strength and size for about three weeks, when it leaves the apple and seeks a hiding place in which to spin its cocoon, the favorite place being under projections of the rough bark of the tree. When first hatched these worms are small, hardly one-eighth of an inch long, white, with a black head and shoulders. When mature, the body is pinkish and the head and shoulders brown. The adult, *a*, fig. 9, issues from the cocoon in about two weeks, appearing near June 15. They commence at once to lay eggs. The worms of this, the second brood, live in the apple all winter, and it is these that disgust the apple eater and cut the profits of the orchardist.

Remedies. The same spray as for canker-worms, used just after the petals of the blossom fall. No eggs are deposited earlier than this. At this time the calyx cup is open, and a little poison in it is apt to prove fatal to the infant worm. In a few days after the egg is laid the calyx closes, and no spray will reach the worm. Remember, this early spraying does away with the parents of the *second* brood, and hence should not be neglected. Bands of burlaps, paper or other material, loosely tied about the tree before June 1, make attractive places for the worms to pupate in. These bands should be examined often, say weekly, and all worms killed. Fallen fruit should be gathered and fed to stock. Cellars, caves and fruit houses should be thoroughly cleaned and fumigated and the cleanings burned every spring, as many thousands of moths are wintered over in them.

FLAT-HEADED BORER.

The adult, fig. 10, is flat, about three-eighths of an inch long, of a greenish black with coppery reflections. They appear about the last of May and deposit eggs from then until September. They generally lay their eggs in a diseased portion of the tree, where it has been bruised, or sun-scalded, or in trees of weak vitality, in bad health from lack of cultivation or moisture, or from soil poverty. The eggs are small and yellowish, and are found singly or in numbers in crevices in the bark. The larva, or borer, fig. 11, when young, is yellowish, with a broad, flat head; it soon bores to the sap-wood, where it feeds. At this time it is easily discovered by the "castings" from the opening. As they become older and larger they bore into the harder wood, making flattened chambers. In about a year they gnaw a channel to the outside, excepting a thin layer of bark, and backing a little way they crowd castings to the front and change into the perfect insect, emerging about the last of May.

Remedies. Keep the tree thrifty, free from bruises or sun-scald, and the flow of sap will drown them. If any are detected by the castings, cut in, and use a hooked wire to pull them out. Some washes will deter the female from depositing eggs. For instance: Equal parts of soft soap and sal soda, with enough crude carbolic acid to give a strong odor. Apply with a brush several times in a season, especially where the bark appears unhealthy.

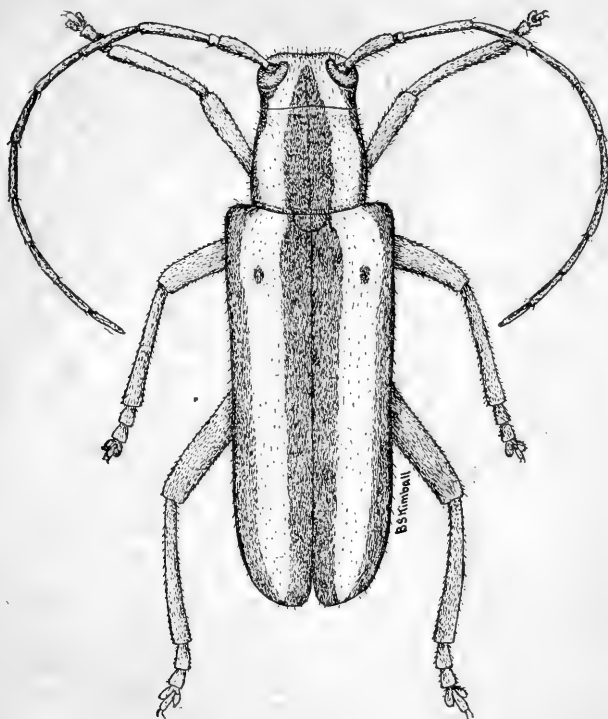


FIG. 12.
Adult Round-headed Borer, greatly enlarged.

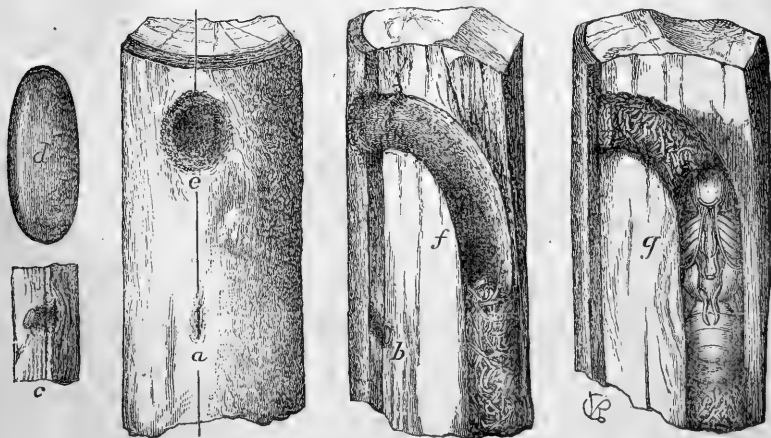


FIG. 14.
a, Incision in which egg is deposited; *b*, same, the wood has been split along line *a*; *c*, showing egg in place; *c*, showing how egg is inserted under bark; *d*, egg greatly magnified; *e*, hole through which adult emerged; *f*, channel of larva; *g*, insect in pupal state just before issuing as an adult.

ROUND-HEADED BORER.

Attacks the same trees under the same conditions as the flat-headed borer. The adult, fig. 12, is about five-eighths of an inch long, brown above, with two white stripes the whole length of the back. Head and under surface grayish. It is a night flyer. The female appears about June 1, and stays until September. She deposits her eggs at night, in small incisions made angling into the bark, generally near the ground. In about two weeks they hatch, and the little borers, *a*, fig. 13, begin to bore their way into the inner bark and sap-wood, leaving the bore filled with "castings," fig. 14. For two summers they stay in the sap-wood and do great damage, often girdling young trees. After the second winter they cut channels up into the hard wood; attaining their growth by fall, they burrow outward to the under side of the bark, and there remain until spring, changing to adults. See *b*, fig. 13. They then gnaw through the bark, and emerge about June 1 to propagate their species.

Remedies. Same as for flat-headed borer.

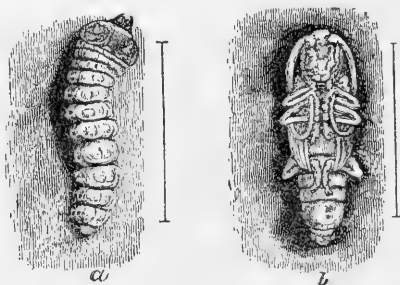


FIG. 13.

Larva and pupa of the Round-headed Borer.

TREE WASHES FOR BORERS.

Observations by members of the Kansas State Horticultural Society.

A. CHANDLER: I used a tree wash last year on apple trees for borers and insects. I have been troubled in my timber (recently cleared) land with borers, and if I had not taken this precaution they would have been worse. It is known as the "Carnahan tree wash." Obtaining it ready prepared in a can, I applied it in June with a whitewash brush to the tree trunks and a portion of the limbs, and found it very beneficial. While it will not *destroy* the borer, I think it will prevent the borer beetle from depositing eggs on the outside. From the healthy appearance of the tree and the smooth appearance of the bark, I think it equals anything I ever tried. It is also good for the prevention of other insects, as tree-crickets, etc., and I think it will destroy the curculio to some extent, and will prevent insects climbing the trees. My trees never looked more thrifty. I cannot say it will prevent root-rot.

F. HOLSINGER: I would like to inquire whether your ground was thoroughly cultivated?

A. CHANDLER: All the cultivation I could give would not prevent borers. I applied the wash from the ground up, as far as I could reach. It costs about two cents per tree from four to six years old, and I do not know but what that might be reduced. This wash is obtained in gallon and half-gallon cans. It should be

applied about twice a year—spring and fall—costing about four cents per year for each tree.

T. A. STANLEY: Would not a strong lime wash do as well.

A. CHANDLER: No; I have no success with it. If the borer is in the tree, you must dig him out with a knife. By examination you can tell whether borers have deposited eggs or not. I do not say it will rid the tree of borers if they have been allowed to deposit eggs and are left for years. It makes the tree grow more vigorous. I do not know what is in this tree wash, but it did no damage.

B. F. SMITH: Chandler has tried this wash, and it has proven successful with him. There are always new things being tried. If he has found something good for trees, we should not object to it. If I receive a package I will try it.

T. A. STANLEY: My experience with borers will date back as far as fifty years ago, when I was a boy, and the best thing to exterminate them with was a jack-knife. A Boston gentleman visiting my father went into the orchard and asked father if he had ever seen any borers. Father told him he knew nothing about them (they were something new in those days). Examining a tree, he took out his jack-knife and went to work near the ground, and he soon showed why the tree was not doing well. With his knife he dug the borer out and said the jack-knife was the best exterminator he knew of. My experience is, if you will attend to it about the 1st of June, when the beetles come out on the tree and deposit their eggs behind loose scales of bark, and wash the tree with strong lime wash, it will kill them. I prefer lime wash to any "nostrum" ever introduced. When they once get into the tree no wash will take them out. Horticulturists have been deceived enough by patent nostrums.

E. J. HOLMAN: By instinct this insect never lays its eggs on the surface. It lays as completely in the wood as the locust, which punctures almost to the heart of a twig. A borer lives three years in the wood; the third year it comes out in perfect form. It goes below in the wood every winter, and the third spring passes the cocoon stage there. They lay about fifty eggs, each placed separate and apart in the wood. Rarely does an egg fail to hatch.

J. W. ROBISON: These beetles are very fierce. Put a half dozen into a bottle and they will beat a bull fight, and will not stop until they kill each other. She is a philosopher; she makes punctures sideways, so the eggs can be laid in a row, and the bark close over them. It is only a few days until they hatch; open the lip where deposited and you can see them plainly. Without cutting the bark, thrust your knife under the lip and you can hear the eggs crack. The larva works round and round until of the size of a pea, and then usually starts upward until he gets level with the surface of the ground, staying there until the next season. He comes up early in the spring. My practice is to hoe around the tree before the time for the round-headed borer to deposit eggs. I keep the weeds clear, so that I can see where the borer went in. If he has been in a year or two he is near the middle, and you had better let him alone, as it will injure the tree to remove him. It is impossible to get rid of these borers by a wash, because the eggs are covered. There is no connection between the round-headed and flat-headed borers.

T. A. STANLEY: It requires three years for the borer to mature and come out. In my experience, the borer selects a spot where loose bark is on the tree, and goes in where it is tender. It lays eggs in even rows. These eggs stay under the bark but a short time when they hatch and the little worm eats into the tender bark, and goes through it, to live and grow there; when large enough they go into the body of the tree. They stay there for three years. Scrape off the bark and put whitewash on the eggs and it will destroy them.

PRESIDENT WELLHOUSE: By taking a knife, cutting into the tree, and running a hooked wire in, you can pull them out. Each female beetle deposits fifty or sixty eggs, and we find it better and less expensive to hunt the borers early in the spring. By carefully examining the bottom of the tree for six or eight inches above the ground you will see a little brown spot. He came to the bark the fall previous, and sets about two inches back in his cavity. If you wait till May, he is out and gone; he is easier taken out in spring than later. By killing the insect you prevent the egg laying. We always have our men hunt for the insects that are about to come out. It is easy to find the little brown spot about the size of your finger end, and you can kill them by pouring a few drops of coal-oil from a machine can into the cavity.

DR. J. STAYMAN: Can we prevent the borer from entering the tree? I have practiced banking up my trees as steep as I can, about a foot high; less may do. The beetle will not deposit eggs where the tree is banked up. I have practiced this for thirty years, and have never seen a borer in my trees since I began it. Like these gentlemen, I at first cut out the borers. We can prevent them by banking up early in the spring. By instinct, it knows the bank will wash down. If it deposits its eggs, how easy to scrape away the mound. I never saw a flat-head borer on a tree that was banked. They always work on the south side, where the sun shines on the tree.

BUD MOTH.

This insect is often very destructive, attacking the blossom and leaf-buds, and in a few mouthfuls destroying that which must make the leaves and fruit, "nipping in the bud" the entire crop of fruit and debilitating the tree. This worm works in early spring, as soon as the buds begin to open; it delights in the prominent terminal buds and its work stops all new growth, causes many leaves to turn brown, and thus brings to the notice of the orchardist its bad work. The moth measures about three-quarters of an inch across its wings, and is mainly a gray color, the middle of the fore wings being lighter, or creamy. This insect first appears on the buds as a small, dark brown worm, about one-fourth of an inch long, with shining black head and shoulders. It imbeds itself in the center of the bud, tying the leaves together with its web. It is an irregular worker, and leaves the bud in a ragged, brown, dilapidated condition.

Its work is most destructive in the nursery, destroying terminal shoots, which sadly interferes with the growth and symmetry of the young tree. Sometimes it burrows from the bud into the pith of the twig for several inches, killing the shoot to the tip. The worm finally settles upon a leaf, cutting the leaf stalk partly off, so that the leaf withers; it then rolls this soft, wilted leaf into a tube around its body, fastening it with webs and lining it for a nest. From this tube nest it comes forth only at night to feed, and when disturbed it hastens into it out of sight. In feeding, it draws leaves towards its home by silken threads, thus forming a bunch of partly eaten leaves, which turn brown, making the nest conspicuous.

After attaining its growth it lies as a pupa in its silk-lined tube about ten days, when it emerges an adult moth, and in three or four days begins to lay its eggs. These moths appear from about June 1 and remain to July 5 or July 10. They are night flyers, and do no damage in the winged state. As the worms are leaf-eaters, spraying with London purple or Paris green, as for canker-worms, must kill many. Whenever their nests are seen they should, if possible, be gathered and burned, and in a badly infested orchard it will pay to rake and burn all the leaves under the trees.

APPLE CURCULIO.

This insect, fig. 15, is usually of a uniform rusty brown color. Four humps or tubercles are easily seen, two on each wing cover near the rear. The snout varies from half to the full length of the insect. With this snout it drills round holes into the apple: these holes are made for food, and are about one-tenth of an inch deep, widened out below like a gourd. The female deposits an egg in such hole, which soon hatches into a tiny worm that usually burrows to the core, and

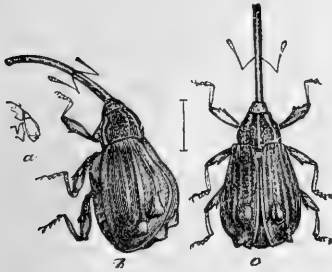


FIG. 15.

a, Beetle, natural size; *b*, beetle, magnified; *c*, side and back view of same, magnified.

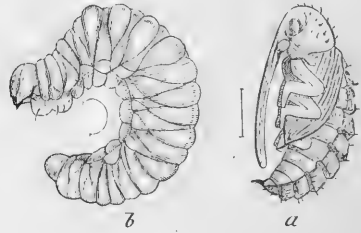


FIG. 16.

a, Pupa stage; *b*, larva, or worm. Hair-lines to the left of pupa show natural size.

produces a reddish excrement. In a month, when fully grown, the worm is soft and white, without feet, wrinkled, and curved crosswise, as in *b*, fig. 16; too humped and crooked to crawl about out of the apple, it stays in and changes to pupa, as in *a*, fig. 16, leaving the apple as a perfect beetle after two or three weeks. It passes the winter in the adult state and begins laying eggs about June 1, continuing until late in August. President Wellhouse says he has surely reduced them by spraying.

LEAF-CRUMPLER, OR LEAF-ROLLER.

The parent of this is a small grayish moth, *d*, fig. 17, which emerges from the unsightly mass of dry leaves, as in *b*, fig. 18, formed the previous season by the insect, and may be seen, gathered, and burned, during the winter. The female immediately begins laying eggs upon the leaves of the tree. During the fore part of June small, brownish worms appear, which at once construct tubular silken cases, in which they hide. They leave these cases, generally at night, to feed. As they grow they attach webs to the partly eaten leaves and gather them about themselves, so that finally the irregular mass of leaves completely hides the

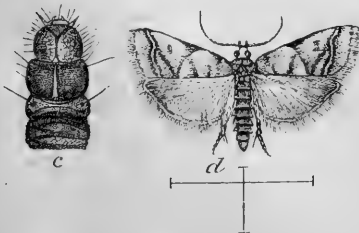


FIG. 17.



FIG. 18.

Here *a* represents worm case; *b*, case attached to a limb; *c*, head and first segments; *d*, perfect moth. All are magnified; the hair-lines just under the moth, *d*, represent the natural size.

tubular case. In the spring, as the buds swell and the leaves appear, they come out and do great damage. They grow until in May, when they close up the opening to the case, and in two weeks the moth emerges, as above.

Remedies. There are two parasites that prey upon them. Collect the cases and tufts of leaves during the winter and burn them. The spray recommended for canker-worm is successful in destroying them.

TWIG-GIRDLER, TWIG-PRUNER, AND TWIG-BORER.

Sometimes trouble orchards, but in Kansas they are not bad. Their habits are indicated by their names, and it is scarcely necessary to describe them in this work. Numerous bulletins are issued free, describing them and their habits. See fig. 19.

ROOT-LOUSE, OR WOOLLY APHIS.

The young are hatched from a minute egg laid in crevices of the bark, near the ground, and are covered with white down. The grown female measures about one-tenth of an inch in length, oval in shape, with black head and feet, dusty legs and antennæ. They attach themselves to the branches and trunk with their long beaks, sucking the vitality from the tree, which they will kill if in large numbers. During the summer the females are wingless, but at autumn both sexes have wings, and it is in this condition that they spread rapidly. They are produced alive at this time of the year with wonderful rapidity. Where plentiful the trunk and branches have a moldy appearance. "Lady-birds" and their larvæ, the larvæ of lace-winged flies and syrphus-flies, the small chalcid fly and spiders devour them. No birds are known to feed upon them.

Remedy. Plenty of lye wash, even soap-suds or soap wash is good. Kerosene emulsion is good. The insect above described is only one form, viz., woolly aphis. The other form, as root-lice, is described below. To the public they are two distinct insects.

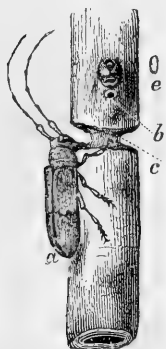


FIG. 19.
Twig-girdler at work.

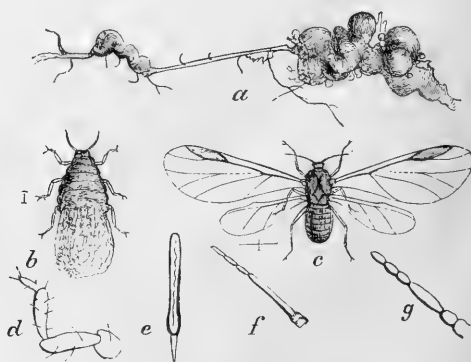


FIG. 20.
Root-lice.

ROOT-LOUSE.

They work underground, puncturing the root to draw its nourishing juice, causing the root tissue to expand into knots and irregularities, *a*, fig. 20, thus making the roots unhealthy and very brittle. These insects are often found in myriads, looking like bluish-white wool, on the roots. Certain beetles, maggots and flies prey upon them, but to only a small extent.

Remedy. Scalding water, at 150 degrees, poured on the uncovered roots. If some concentrated lye is added it is still better. Filling above the roots with tobacco dust is recommended. Soap-suds and wood ashes are beneficial. Young trees from the nursery, if infested, should have the roots well trimmed (burn the trimmings) and then dipped in lye. If quite hot it is still better.

FRINGED-WING APPLE-BUD MOTH.

The following is condensed from bulletin No. 42, written by Prof. J. M. Stedman, entomologist of the state university, Columbia, Mo.: The fringed-wing apple-bud moth is a new and heretofore undescribed species of insect, increasing rapidly and infesting new areas. The best spray to destroy them is, one pound pure Paris green, three pounds of fresh lime, and 150 gallons of water, constantly agitated while spraying. First application as soon as the buds open sufficiently to give the tree a green tinge; second, five days later; third, at time flower-buds open; if it rains do it over at once. Kill the worms before they eat into the bud. The egg is very small, light yellow, and oval, and apt to escape notice. The



FIG. 21.



FIG. 22.



FIG. 23.

young worm is also very small when hatched and of a light yellow color, which afterwards turns to pale green, a shining black head, and a brown spot (which soon turns black) back of the head. It has three pairs of dark-colored true legs under its fore parts, and five pairs of prolegs under the rear three-fifths of the body. As soon as hatched they begin to feed on the unfolding leaves, and at once crawl to the heart of the expanded flower or leaf-bud.

The destructive effects cause the tree to look as if swept by fire, owing to the brown and partly developed foliage. See fig. 24. These worms (fig. 21) com-



FIG. 24. Work of the Fringed-wing Apple-bud Moth.

plete their growth in about four weeks, enter the earth, and, passing one or two inches below the surface, spin a cocoon. They come out as adult moths in about six weeks, or about the middle of July. Fig. 22 is the moth enlarged; fig. 23, natural size. The females soon begin to lay eggs, singly, on the young apple leaves. From these eggs a second brood is hatched more quickly than the spring brood. This second brood often eats through the heart of the terminal bud into the twig. When grown, this second brood enters the ground as did the first, but do not come forth as adults until the following spring.

RABBITS.

The Wellhouse rabbit trap, of which we here give description and illustrations, is one used by President Wellhouse. He has 3000 of them, distributed two per acre, and says it is the result of thirty years' experience. He uses nothing else to protect his trees. Figure 25 is a longitudinal section of the trap. Figure 26 is a front-end view of the trap, on a scale three times that of fig. 25, and shows the details of the door. The trap consists of a box made of fence boards (old ones preferred) six inches wide and one inch thick. The boards are cut twenty-two inches long, and the top and bottom boards are nailed onto the side boards, thus making the opening four inches wide and six inches high. The door, *a*, is

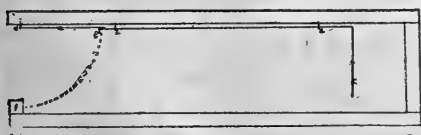


FIG. 25.

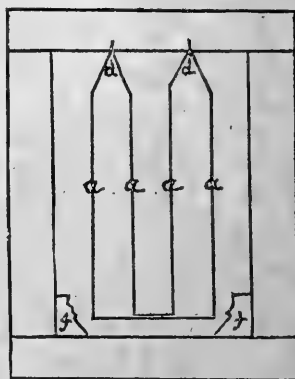


FIG. 26.

made of wire, shaped as shown in fig. 26, and hung to under side of the top board with two staples, shown at *dd*. The trigger, *b*, is of wire, bent as in fig. 25, spread out, or with a loop or figure 8, at the hanging end, and is fastened loosely along the center on the under side of the top board with two staples.

To operate the trap, push the door, *a*, inward, and with the forefinger catch the hooked end of the trigger, *g*, and pull it forward until the door rests on the wire above the hook at *g*. The rabbit enters the trap, prompted by curiosity or otherwise, and by so doing pushes the trigger, *c*, back as he would a little brush in a hollow log, without any suspicion or alarm. This action loosens the door, which falls behind him, its lower edge resting against the shoulder at *f*, and bunny is then caught. This trap was invented by Walter Wellhouse, but it is not patented. He uses no bait. The trap cannot be sprung by birds or wind. If new lumber is used, it must be stained some dark color, using material not offensive to a rabbit's delicate sense of smell.

APPLES FOR THE TABLE.

Compiled, by request, by MISS GERTRUDE COBURN, Professor of Domestic Economy,
Iowa Agricultural College, Ames, Iowa.

Chemical analysis of apples, fairly representing the average composition, indicates that the total nutriment is about fifteen per cent. of the whole weight, and consists principally of sugar, organic acid, and pectin (which gelatinizes when boiled and cooled). Although the fruit is thus shown to be but slightly nutritious, it is generally palatable and wholesome. It easily supplies variety in diet throughout the year, and it has the advantage of being suitable for any meal and combining agreeably with many other common food materials.

When ripe, and carefully selected, the uncooked apple is toothsome and healthful, either alone and between meals or as one of the table fruits. The indigestible skin and cellulose, with the water and acid, contribute to the dietetic value, in that they make the whole raw apple a laxative food, especially effective when eaten before breakfast or at night.

Cooked entire, and without any addition, the well-flavored apple is among the most perfect and economical of the subacid fruits for every-day use, and for the invalid's tray is seldom surpassed. Baked in its own juice, with sugar and additional flavoring, or boiled in syrup, it is relished equally with the breakfast mush, the dinner meat, and the supper bread and cake. Combined with cream, custard, whipped white of egg, or tapioca, which add nutriment without destroying the fruit flavor, it affords a delicate dessert, inexpensive and easily prepared. Steamed or baked, with a light covering or crust of biscuit dough or pastry, it has a variety of forms, all used for dinner, and usually made complete with sweetened cream, or in other cases with a bit of good cheese.

The skin, while not digestible, is not often injurious, and as the best flavor is contained in the surface portion of the apple, careless paring is wasteful and unnecessary, especially when the fruit is to be baked. The unbroken envelope retains the steam produced as the juice is heated, thus hastening the process of expanding and bursting the tiny cells and converting the firm pulp into a delicate sauce. This suggests that, in order to produce the desirable lightness, the oven should be sufficiently hot to change the water of the fruit into steam. If the skin is tough or for other reasons is removed, the clean, unblemished parings, with the cores, may be simmered in water until the flavor and color make it a useful addition for pudding sauce, preserves, or jelly. It is usually best to remove the core before cooking, and, when the apple (as for compote) is not to be otherwise cut after paring, it should be cored before the skin is taken off, to prevent breaking.

The various forms of boiled and steamed apples are attractive and generally liked. The requisites are: To select good fruit and wash it clean before cutting; to remove only a thin paring, *all* of the core, and the bruised, discolored and defective parts; to intensify rather than obscure the apple flavor, using only enough of sugar, spice, or lemon, when any is needed, to accomplish this purpose; to use granite or porcelain-lined utensils (avoiding even tin covers) and silver or wooden spoons; to retain by slow cooking and careful handling the perfect form of the fruit, or else to produce, by stirring and straining, a light, lumpless sauce; to serve the apple preparation with the same respectful and dainty care that is usually bestowed upon the rarer but not more worthy pineapple and orange.

In the summer and autumn, when the fruit is at its best, no additional flavor is needed. Toward spring, when it becomes less palatable, the deficiency may be best supplied with a little lemon juice and grated rind, a bit of pineapple or quince, a few drops of almond extract or rose water, or a few whole cloves. Sweet apples which are dry and rather tasteless may be utilized satisfactorily if stewed, canned or preserved with one-third their bulk of quince.

APPLES, RAW, FOR BREAKFAST.—Select fresh, unspotted apples of good flavor, but not very sour, wash and wipe thoroughly, and arrange tastefully, alone or with other fruit. For serving, use small plates and fruit-knives, to be removed with them. Individual taste must decide whether the fruit should be eaten before or after the heavier part of the breakfast.

APPLES AND CREAM.—A delicious breakfast dish, to be served with the cooked cereal or alone, consists of fresh, mellow, sweet apples, pared and sliced, sprinkled with fine sugar and dressed with cream.

APPLES AND BREAD AND MILK.—For a summer luncheon, a bowl of rich milk and bread may be pleasantly varied by the addition of a ripe sweet apple, pared and thinly sliced. If the fruit is not thoroughly ripe and mellow, it is improved by slow baking until quite soft.

BAKED APPLES.—Select moderately tart or very juicy sweet apples, of equal size. Wash them, remove the cores (or at least the blossom ends) and any imperfections, with the skin also, if it is objectionable. Put in a shallow baking dish, and fill the cavities with sugar and such flavoring as seems to be demanded, allowing from one-third to one-half of a cup of sugar and about one-fourth of a teaspoonful of nutmeg or cinnamon to eight apples, with sometimes the juice and grated rind of half a lemon. Cover the bottom of the dish with boiling water (which may need to be replenished if the fruit is not very juicy), and bake in a hot oven until soft, basting often with the syrup in the dish. Sweet apples need to bake longer and more slowly than sour, and when done should be very soft. Set the baking dish in a cool place until the fruit is almost cold, then transfer the apples to a glass dish and pour the syrup, which should be thick and amber colored, around them.

APPLES IN BLOOM. (By consent, from "Boston Cooking-School Cook-Book," by Miss Farmer.)—Select eight red apples, cook in boiling water until soft, turning them often. Have water half surround apples. Remove skins carefully, that the red color may remain, and arrange on a serving dish. To the water add one cup sugar, grated rind one-half lemon, and juice one orange; simmer until reduced to one cup. Cool, and pour over apples. Serve with sweetened whipped cream or cream sauce.

BAKED APPLE-SAUCE. (By consent, from "Every-Day Dishes," by Mrs. E. E. Kellogg.)—Pare, core and quarter apples to fill an earthen crock or deep pudding dish, taking care to use apples of uniform degree of hardness and pieces of the same size. For two quarts of fruit thus prepared, add a cup of water and, if the apples are sour, a cup of sugar. Cover closely, and bake in a moderate oven several hours, or until of a dark red color. Sweet apples and quinces, in the proportion of two parts of apple to one of quince, baked in this way, are also good. Cut the apples into quarters, but slice the quinces much thinner as they are more difficult to cook. Put a layer of quince on the bottom of the dish, and alternate with layers of apple until the dish is full. Add cold water to half cover the fruit, and stew in the oven, well covered, without stirring, until tender. Fruit cooked in this way may be canned while hot and kept for a long period.

STEWED APPLES.—Pare, quarter and core six or eight tart apples; put them into a granite kettle, strew with one cup or less of sugar, add juice of half a lemon and a few bits of the yellow rind; cover with boiling water and simmer (not boil) until tender. Dish carefully, without breaking, and serve cold.

GREEN-APPLE SAUCE.—For sour green apples it is best to use a sharp silver knife, to prevent discoloration. Cut the apples in quarters, remove the cores and skin, and drop them as fast as pared into a bowl of cold water. Skim them out into a granite kettle with a large bottom, so that there will not be much depth to the apples. Add boiling water enough to show among the pieces, cover tightly, and cook quickly. Shake the pan occasionally, and as soon as the fruit is soft mash it with a silver fork, add sugar to taste, and when it is dissolved remove from the fire. Serve hot or cold. This sauce should be free from lumps, light colored and not very sweet. A pinch of salt may be an improvement.

APPLE-SAUCE FOR GOOSE OR PORK.—Pare, quarter and core six tart apples. Put them in a granite saucepan, cover with water, boil until tender, and press through a colander; add a teaspoonful of butter, a dash of nutmeg or cinnamon, and sugar to taste, being careful to keep the sauce tart.

CANNED APPLES. (By consent, from Mrs. Rorer's "Philadelphia Cook-Book.")—To four pounds of apples use one pound of sugar, the juice and yellow rind of one lemon, and one quart of water. Choose fine ripe Pippins or Bellflowers. Pare, core, and throw them into cold water. When you have sufficient to fill one or two jars, lift them carefully from the water, weigh, then put them in a porcelain-lined kettle, cover with boiling water, bring quickly to the boiling-point, and then stand them over a moderate fire, where they will scarcely bubble, until tender. While they are cooking, put the sugar and water into another kettle, stir with a clean wooden spoon until the sugar is thoroughly dissolved, add the lemon, and boil three minutes. With a perforated skimmer lift the apples from the water, hold a moment until drained, and then slide them carefully into the boiling syrup; continue until the bottom of the kettle is covered; boil until the apples are sufficiently tender to admit a straw, then lift them carefully and slide one at a time into the jar. The jars should be thoroughly cleaned and heated and set on a folded wet towel. After passing a silver spoon handle around the inside of the filled jar to break any air bubbles present, screw on the top as quickly as possible. Stand the jars in a warm place in the kitchen over night, and in the morning again tighten the covers and put away in a cool, dark, dry closet.

APPLE COMPOTE. (By consent, from Mrs. Lincoln's "Boston Cook-Book.")—Make a syrup with one cup of sugar, one cup of water, and a square inch of stick cinnamon. Boil slowly for ten minutes, skimming well. Core and pare eight or ten tart apples and cook until nearly done in the syrup. Drain, and cook them for a few minutes in the oven, with the door open. Boil the syrup until almost like a jelly. Arrange the apples on a dish for serving, fill the core cavities with jelly or marmalade, and pour the syrup over them. Put whipped cream around the base and garnish the cream with jelly.

APPLE PRESERVES. (By consent, from Mrs. Rorer's "Philadelphia Cook-Book.")—Core and pare fine ripe Pippins, and cut them into quarters. Weigh, and to each pound allow one pound of granulated sugar and a half pint of boiling water, the grated rind of one and the juice of two lemons. Boil the sugar and water until clear (about three minutes), skimming when necessary; add the lemon juice and rind, then the apples, and *simmer* gently until they are clear and tender, but not broken; then stand aside to cool. When cold put them into jars, cover closely, and stand them in a cool, dark place for one week. At the

end of that time turn them carefully into the kettle, bring them to the boiling-point, and *simmer* for five minutes; then return them to the jars, cover closely with tissue paper brushed over with the white of an egg, and put in a dark, cool place to keep.

APPLE BUTTER. (By consent, from Mrs. Rorer's "Philadelphia Cook-Book.")—This should be made from new cider, fresh from the press, and not yet fermented. Fill a porcelain-lined kettle with cider, and boil until reduced one-half. Then boil another kettleful in the same way, and so continue until you have sufficient quantity. To every four gallons of boiled cider allow a half-bushel of nice, juicy apples, pared, cored, and quartered. The cider should be boiled the day before you make the apple butter. Put the boiled cider in a very large kettle, and add as many apples as can be kept moist. Stir frequently, and when the apples are soft beat with a wooden stick until they are reduced to a pulp. Cook and stir continuously until the consistency is that of soft marmalade and the color is very dark brown. Have boiled cider at hand in case it becomes too thick, and apples if too thin. Twenty minutes before you take it from the fire add ground cinnamon and nutmeg to taste. It requires no sugar. When cold, put into stone jars and cover closely.

APPLE JELLY. (By consent, from Mrs. Rorer's "Philadelphia Cook Book.")—Lady Blush or Fall Pippins are best for jelly. The first make a bright-red jelly, and the latter an almost white jelly. Wipe the fruit, cut it into pieces without paring or removing the seeds. Put into kettle and barely cover with cold water; cover the kettle, and boil slowly until the apples are very tender; then drain them through a flannel jelly bag—do not squeeze or the jelly will be cloudy. To every pint of this juice allow one pound of granulated sugar. Put the juice into the kettle and bring it quickly to the boiling-point; add the sugar and stir until dissolved, and then boil rapidly and continuously until it jellies, skimming as a scum rises to the surface. Twenty minutes is usually sufficient for the boiling, though not always. After fifteen minutes' boiling begin the testing by taking out one teaspoonful of the boiling jelly, pouring it into the bottom of a saucepan, and standing it in a cool place for a moment. Scrape it up with the side of a spoon, and, if jellied, the surface will be partly solid; if not, boil a few minutes longer and try again; as soon as it jellies roll the tumblers in boiling water and fill with the boiling liquid. Stand aside until cold and firm (about twenty-four hours). If the glasses have lids put them on; if not, cover with two thicknesses of tissue paper and paste the edges down over the edge of the tumbler. Then moisten the papers with a sponge dipped in cold water, so that when it dries it will shrink and be tight. Keep in a cool, dark place.

APPLE ROSE CREAM. (By consent, from Mrs. E. E. Kellogg's "Every-Day Dishes.")—Wash, core, slice and cook without paring a dozen fresh Snow apples until soft and very dry. Rub through a colander to remove skins, add sugar to taste and the beaten whites of two eggs, beating vigorously until stiff; add a teaspoonful of rose-water for flavoring, and serve at once or keep on ice. It is important that the apples be very dry, as otherwise the cream will not be light. Other varieties of apples may be used, and flavored with vanilla or pineapple. It is sometimes better to steam the apples than to stew them tender.

APPLE TAPIOCA PUDDING. (By consent, from Mrs. Lincoln's "Boston Cook-Book.")—Pick over and wash three-quarters of a cup of pearl tapioca. Pour one quart of boiling water over it, and cook in the double boiler until transparent: stir often and add a half teaspoonful of salt. Core and pare seven apples. Put them in a round baking dish and fill the core cavities with sugar and lemon juice.

Pour the tapioca over them and bake until the apples are very soft. Serve hot or cold, with sugar and cream. A delicious variation may be made by using half pears or canned quinces and half apples.

APPLE AND RICE PUDDING.—Steam one cupful of rice in two cupfuls of boiling salted water until soft. With this, line a buttered pudding dish on the sides and bottom, leaving a portion for the top. Fill the dish with thinly sliced tart apples and cover with the remainder of the rice. Put the dish in a steamer and steam until the apples are found to be tender by running a fork into them. Set it away to cool and invert the dish so that the pudding will come out entire. Serve with sweetened cream, thin custard, or fruit sauce. Flavoring may be added to the apple according to taste.

DUTCH APPLE CAKE. (By consent, from Mrs. Lincoln's "Boston Cook-Book.")—One pint flour, one-half teaspoonful salt, two heaping teaspoonfuls baking-powder, one-fourth cup butter, one egg, one scant cup milk, four sour apples, two tablespoonfuls sugar. Mix the dry ingredients in the order given; rub in the butter, beat the egg and mix it with the milk, then stir this into the dry mixture. The dough should be soft enough to spread half an inch thick on a shallow baking pan. Core, pare and cut four or five apples into eighths; lay them in parallel rows on top of the dough, the sharp edge down, and press enough to make the edge penetrate slightly. Sprinkle the sugar on the apple. Bake in a hot oven twenty or thirty minutes. To be eaten hot with butter as a tea cake, or with lemon sauce or with sugar and cream as a pudding.

SCALLOPED APPLES. (By consent, from Mrs. Lincoln's "Boston Cook-Book.")—Mix half a cup of sugar and an eighth of a teaspoonful of cinnamon or the grated rind of half a lemon. Melt half a cup of butter and stir it into one pint of soft bread crumbs; prepare three pints of sliced apples. Butter a pudding dish, put in a layer of crumbs, then sliced apple, and sprinkle with sugar; then another layer of crumbs, apple, and sugar, until the materials are used. Have a thick layer of crumbs on top. When the apples are not juicy, add half a cup of cold water; and if not tart apples, add the juice of half a lemon. Bake about an hour, covering at first to prevent burning. Serve with cream. Ripe berries and other acid fruits may be used instead of the apples, and oat-meal or cracked-wheat mush in place of the bread crumbs.

BROWN BETTY. (By consent, from "Century Cook-Book.")—In a quart pudding dish arrange alternate layers of sliced apples and bread crumbs; season each layer with bits of butter, a little sugar, and a pinch each of ground cinnamon, cloves, and allspice. When the dish is full pour over it a half cupful each of molasses and water mixed; cover the top with crumbs. Place the dish in a pan containing hot water, and bake for three-quarters of an hour, or until the apples are soft. Serve with cream or with any sauce. Raisins or chopped almonds improve the pudding.

FRIAR'S OMELET. (Mrs. Treat.)—Stew six or seven good-sized apples as for apple-sauce; when cooked and still warm stir in one teaspoonful of butter and one cupful of sugar; when cold, stir in three well-beaten eggs and a little lemon juice. Now put a small piece of butter into a saucepan, and, when hot, add to it a cupful of bread crumbs and stir until they assume a light-brown color. Butter a pudding mold, and sprinkle on the bottom and sides as many of these bread crumbs as will adhere; fill in the apple preparation, sprinkle bread crumbs on top, bake it for fifteen or twenty minutes, and turn it out on a good-sized platter. It can be eaten with or without a sweet sauce.

BAKED APPLE DUMPLINGS.—Make a short pie-crust; roll it thin and cut it into squares large enough to cover an apple. Select apples of the same size, core and pare them, and fill the space with sugar, butter, and a little ground cinnamon or nutmeg. Place an apple in each square of pie-crust; wet the edges with water or white of egg, and fold together so that the points meet on the top. Pinch and turn the edges so that they are suited. Bake in a moderate oven about forty minutes, or until the apples are soft without having lost their form. Serve with hard sauce or with sugar and cream.

STEAMED APPLE DUMPLINGS.—Core and pare six or eight apples. Make a biscuit dough, using four cups of flour, two heaping teaspoonfuls of baking-powder, one large tablespoonful of butter, one teaspoonful of salt, and one cup of milk. Use more or less milk as is needed to make a soft dough that will roll out without being sticky. Roll the dough about half an inch thick and cut in squares to cover the apples, as in the preceding recipe, after sweetening and flavoring. Place the dumplings on a dinner plate which can be set in the steamer. Steam forty minutes and serve from the same plate, with hard sauce or sweetened cream. A variation of this recipe, which is sometimes more convenient, is as follows: Cut the apples into eighths, and put them, with half a cup of water, into a granite pudding pan; roll the biscuit dough out to fit the pan, and cover the apples; cover the pan, and steam or cook in the oven. Sprinkle sugar thickly over the top and serve in the pudding pan, with hard sauce in another dish.

APPLE PIE. (By consent, from "Boston Cooking-School Cook-Book," by Miss Farmer.)—Four or five sour apples, one-third cup sugar, one-fourth teaspoon grated nutmeg, one-eighth teaspoon salt, one teaspoon butter, one teaspoon lemon juice, few gratings lemon rind. Line pie plate with paste. Pare, core, and cut the apples into eighths; put row around the plate one-half inch from the edge, and work toward the center until the plate is covered; then pile on the remainder. Mix sugar, nutmeg, salt, lemon juice and rind and sprinkle over the apples. Dot over with butter. Wet edges of under crust, cover with upper crust, and press edges together. Bake forty to forty-five minutes in a moderate oven. A very good pie may be made without butter or lemon. Cinnamon may be substituted for nutmeg. Evaporated apples soaked over night in cold water may be used in place of the fresh fruit.

APPLE FRITTERS.—Core and pare three or four apples. Cut them crosswise into slices one-third of an inch thick, leaving the opening in the center. Sprinkle with lemon, sugar, and spice. Let stand one hour. Dip each slice in fritter batter, and fry in deep, hot fat. Drain, and sprinkle with powdered sugar. Serve hot, with or without hard sauce.

BATTER FOR FRITTERS.—One cup flour, one-fourth teaspoonful salt, two-thirds cup milk, yolks and whites of two eggs beaten separately, one tablespoonful olive oil or melted butter. Mix salt and flour, add milk gradually, yolks of eggs, butter, and stiff whites. A tablespoonful of sugar may be added, if liked.

FRIED APPLES.—Cut slices one-half inch thick across the apple without removing skin or core, or cut the apple in quarters and remove the core. Sauté the apples in butter or drippings until tender and light brown, but not soft enough to lose form. Serve on the same dish with pork chops.

APPLE WATER (for invalids).—Wipe, core and pare one large sour apple. Put two teaspoonfuls sugar in the core cavity, and bake until tender. Pour one cup boiling water over the baked apple, let it stand one-half hour, strain, and serve.



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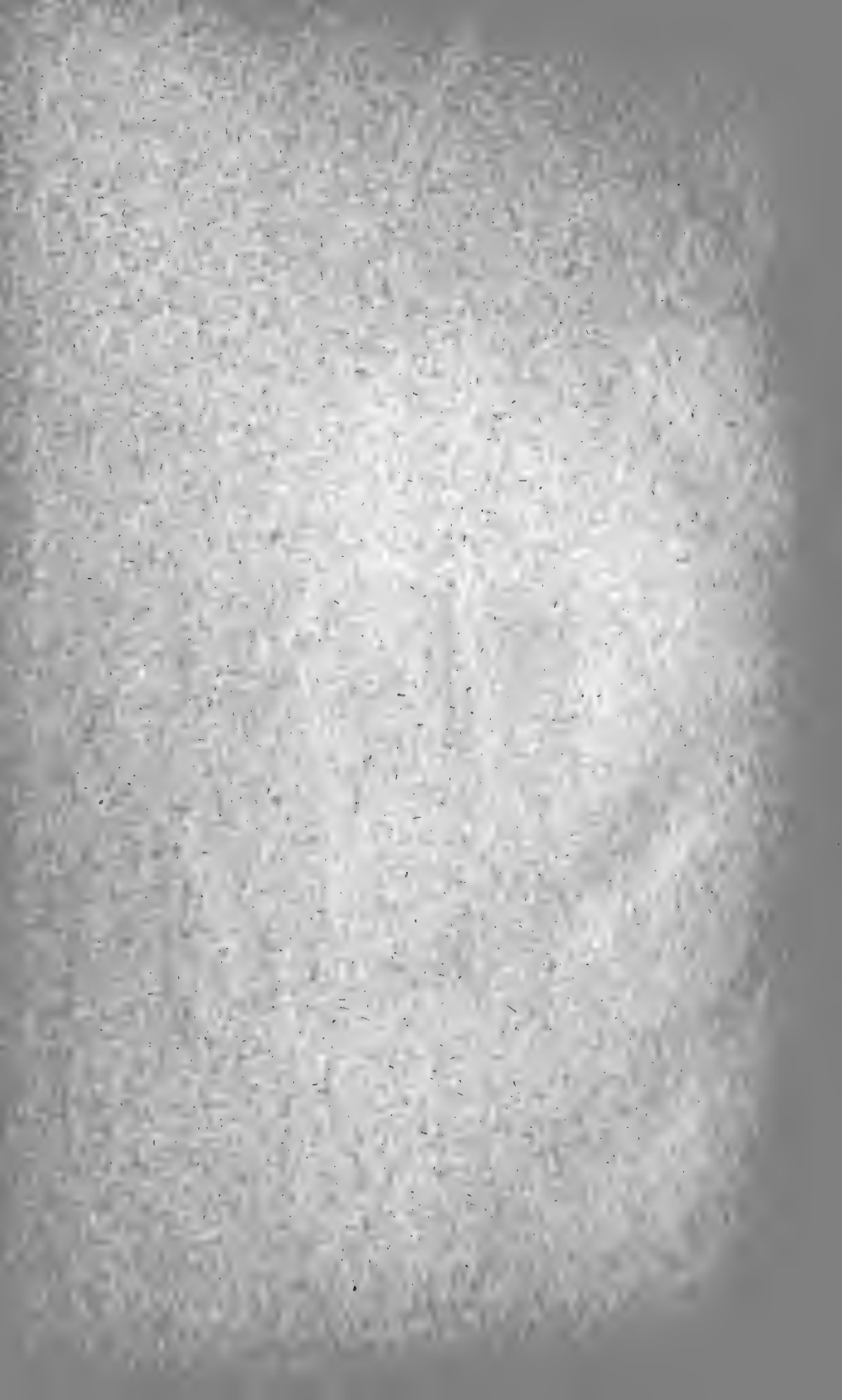
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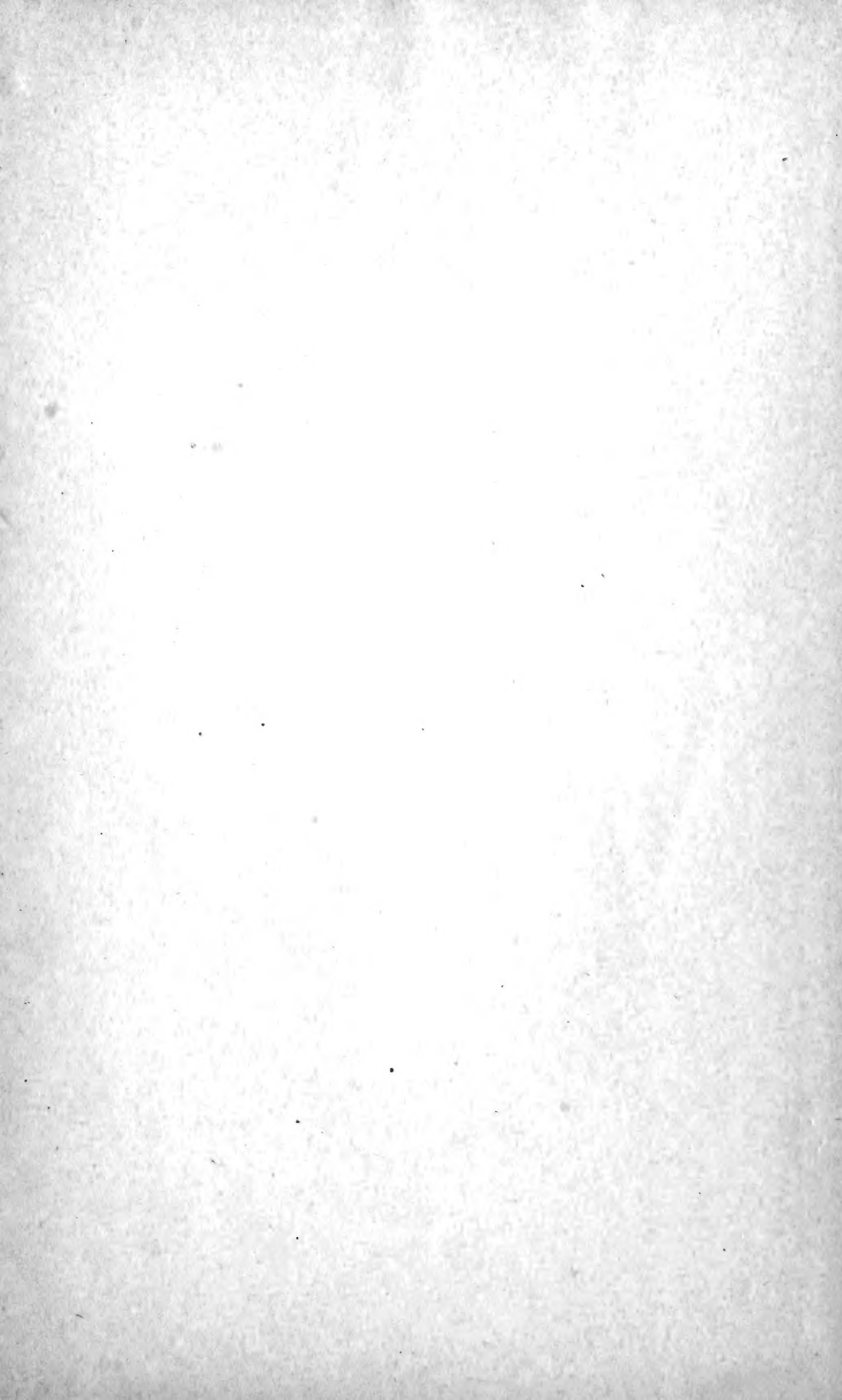
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