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Renewing Old Orchards in Kentucky
First Year Results in a Five Year Program

BY

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The Government Crop and Census Report for many years has shown that the State of Kentucky produces millions of bushels of apples; in 1917 it ranked seventh in production. The question naturally arises where these apples are produced, and whether they come from commercial orchards or from smaller plantings distributed thruout the State. Careful observations disclose the fact that the commercial orchards are few and confined to a few sections; the natural inference is that the bulk of apples has been produced in the small orchards, many of which are located on the general farm.

Visiting the apple markets and local fruit stands in our towns and cities, one will find that most of the apples have been grown, boxed, or barreled in other sections of the United States. The damage due to insects and diseases, and the absence of grading and proper methods of distribution of apples have limited the supply of home grown fruit in our markets. The apples produced in this State under good orchard practises are of excellent quality, and there is no good reason why we should not supply our own markets.

ATTITUDE OF THE FARMER.

The farm orchards, however, are rapidly disappearing, tho some are capable of producing normal crops. They were planted, for the most part, by farmers who knew little of orchard management and who hardly expected the trees to become a source of farm income like other crops, but hoped they would at least produce some fruit for home use. As a

result, the orchard was often planted in a part of the farm that was considered unproductive, and the trees were left to care for themselves.

It is not uncommon for farmers to express the opinion that apples cannot be grown as formerly, and that the orchard had deteriorated to the point where it does not pay to purchase a spray outfit and spray material. Again, the handling of the trees will require too much time, and the other farm crops would suffer. In many cases the orchard is located on a farm operated by a tenant who will not work it except to use the ground for a pasture, or for growing corn or tobacco.

WILL IT PAY TO RENEW AN OLD ORCHARD?

The questions as to what it will cost, how much time it will take, and what returns may be expected, have been asked frequently regarding the renewal of old orchards.

To answer these questions and to encourage better production, the Department of Horticulture, thru the Extension Division, has undertaken to co-operate in the renewal of seven orchards located in Breckenridge, Daviess, McCracken, Oldham and Washington counties.

ORCHARDS SELECTED FOR REJUVENATION.

The orchards were of the type usually found on the general farm. The selection was based on good general condition of the trees, such as sound trunk and scaffold limbs. Orchards containing very old trees that had been mutilated by having all the lower limbs destroyed by the ax or other means were not considered. It does not pay to spend much time on trees of this sort; they should be sent to the brush pile and the land used for other purposes.

The number of trees in the orchards ranged from eighteen to one hundred and twenty-five, the age varying from twelve to twenty years. Ten per cent of the number of trees in each orchard were left untreated to show the comparative results.

These orchards had been neglected for many years, having occasionally borne fruit of inferior quality which in most cases fell from the trees before maturity. The bodies and limbs of

many of the trees were covered with moss and lichens, while the smaller branches and twigs were short and scrubby, and infested with disease cankers. There were numerous dead and worn out fruit spurs thruout the trees, and only a few inches of annual twig growth on most branches, indicating a lack of soil fertility.

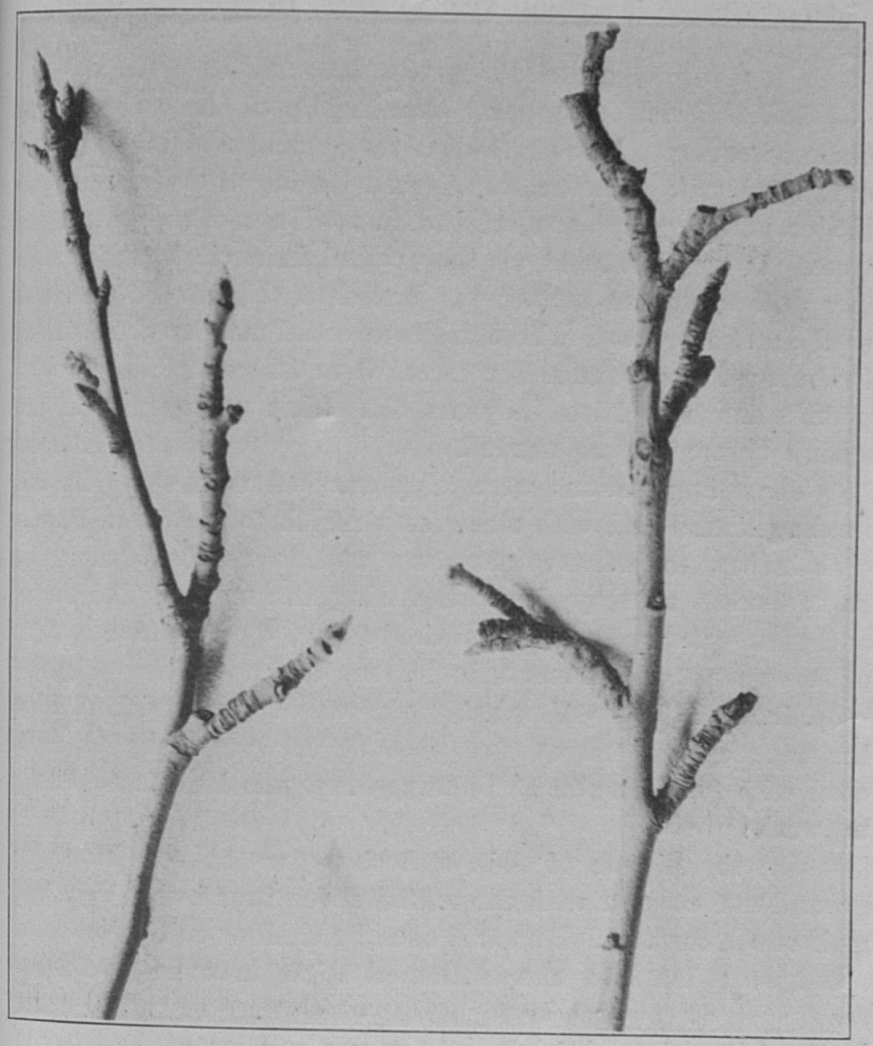

Figure I. Fruit spurs.
Productive. Non-productive.

The soil in these orchards was grown up to weeds, sedge, and other grasses together with such other undergrowth as

briars, young locust, and sassafras bushes. The ground had become hard and dry from pasturing live stock, and there had been no attempt in any case to fertilize the trees.

The infestation of San Jose Scale was not as serious as might have been expected in these old orchards, due, perhaps, to the fact that the bark of the trees, being more or less dry and hard, made it difficult for the insect to gain a foothold.

ORCHARD MANAGEMENT.

Soil Culture. A general cleaning up of the orchards was made in order to be able to disk the ground and break up the dry, hard soil. Manure was spread during the winter, in all the orchards except one, at the rate of a ton to every three trees. It was scattered on the ground in a circle under each tree and somewhat beyond the branches. Nitrate of soda was used in one orchard where manure could not be obtained, at the rate of five pounds for trees 10 to 12 years old, or eight pounds for trees 15 to 20 years old. This was applied in the spring before growth started.

These applications were supplemented with the grass cut in the orchard and with straw as a mulch to the depth of several inches, to conserve moisture and to protect the apples from bruises as they dropped during the season. The mulch and grass was kept away from the body of the tree to a distance of several feet to prevent injury from field mice.

Modified Straw Mulch Recommended. A variation from the type of orchard culture practist this year may often be used with good results as follows, where the land is not likely to wash:

Use the nitrate of soda and straw as above. Plow the ground not covered with the mulch about four inches deep and maintain a dust mulch on this area by shallow cultivation until about July 1st. Sow the cultivated space in some leguminous crop, such as cowpeas or soybeans, which may be turned under in the fall and followed by rye or rye and vetch, the latter to remain on the ground as a winter cover crop. The following spring turn under this cover crop, and continue cultivation as in the previous year.

The nitrate of soda provides immediate plant food in early spring, which is essential for early development of fruit buds. The straw and cultivation hold the moisture, a limiting factor in fruit production, and turning under cover crops provides for future plant food.

Figure II.
Pruning Bearing Tree.
Before Pruning.

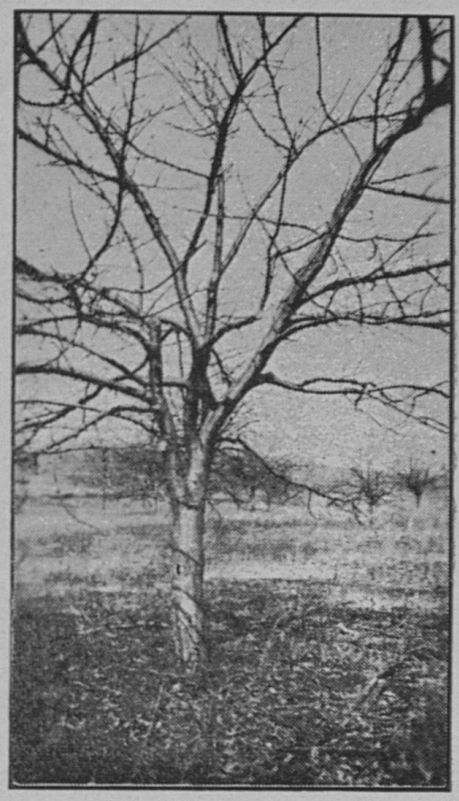

Figure III.
Pruning Bearing Tree
After Pruning.

Pruning. The pruning consisted largely in cutting out dead and badly diseased branches. The removal of large limbs, especially in the center of the tree, was avoided because this type of pruning encourages excessive growth of water sprouts, invites sunscald, and has a tendency to prevent the development of fruit buds.

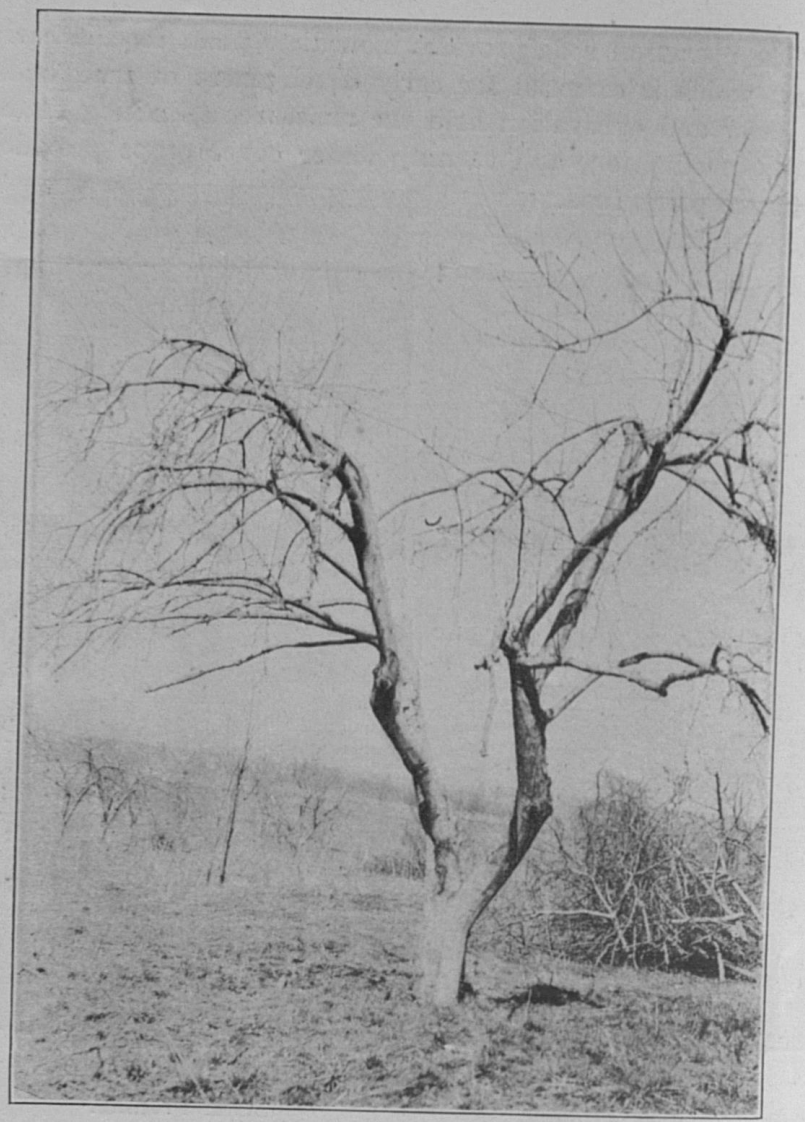

Figure IV. Bearing tree overpruned.

A general thinning out of small branches in crowded areas of the tree was practist in order to admit sunlight and air and permit the distribution of more sap to the poorly nourished fruit spurs. The short branches growing along the main limbs, especially on the inside of the tree, were not cut out because they contained fruit spurs capable of producing fruit. Many

of the trees had grown to such a height that spraying the fruit in the top was hindered. The heading-back of these upright branches was left to the following year's pruning. It is better practis to prune lightly for several years than to attempt to both thin out the tree and lower the height in one season. All cuts should be made close to the main limb, leaving no stubs. Destroy all dead and diseased branches by burning.

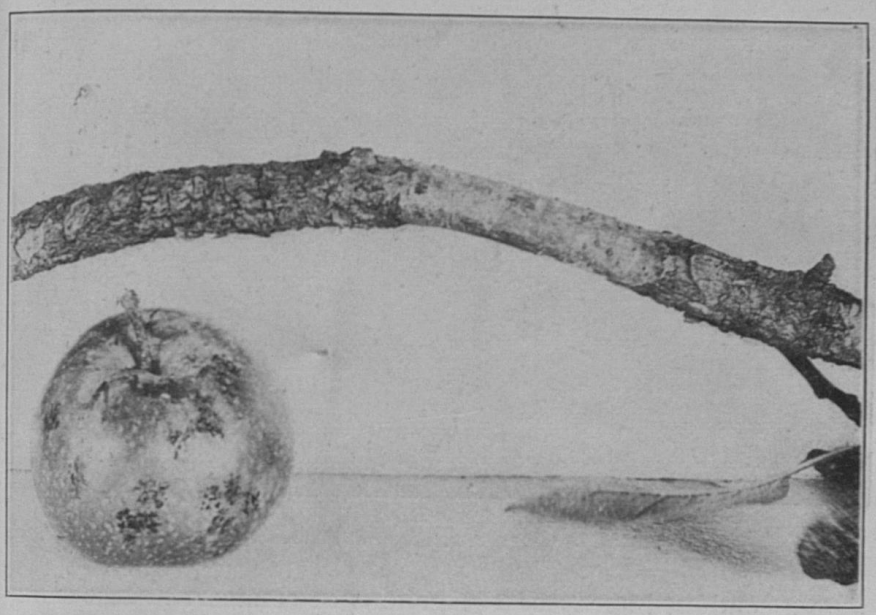

Figure V. Apple blotch on fruit and branch.

Spraying. With two exceptions, the owners of each orchard secured a spray outfit consisting of a barrel spray-pump, twenty-five feet of spray hose, an 8 to 10 foot spraying rod, and a disk nozzle. The spray program, following as far as possible the recommendations of the Department of Horticulture, consisted of one dormant and four summer sprays.

The dormant spray of 1 gallon of commercial lime sulfur to 8 gallons of water was used in six orchards, with scalecide, 1 part to 15 parts of water, in the seventh. This was applied in early spring to control the San Jose Scale. The series of summer sprays began when the petals had fallen, using at this

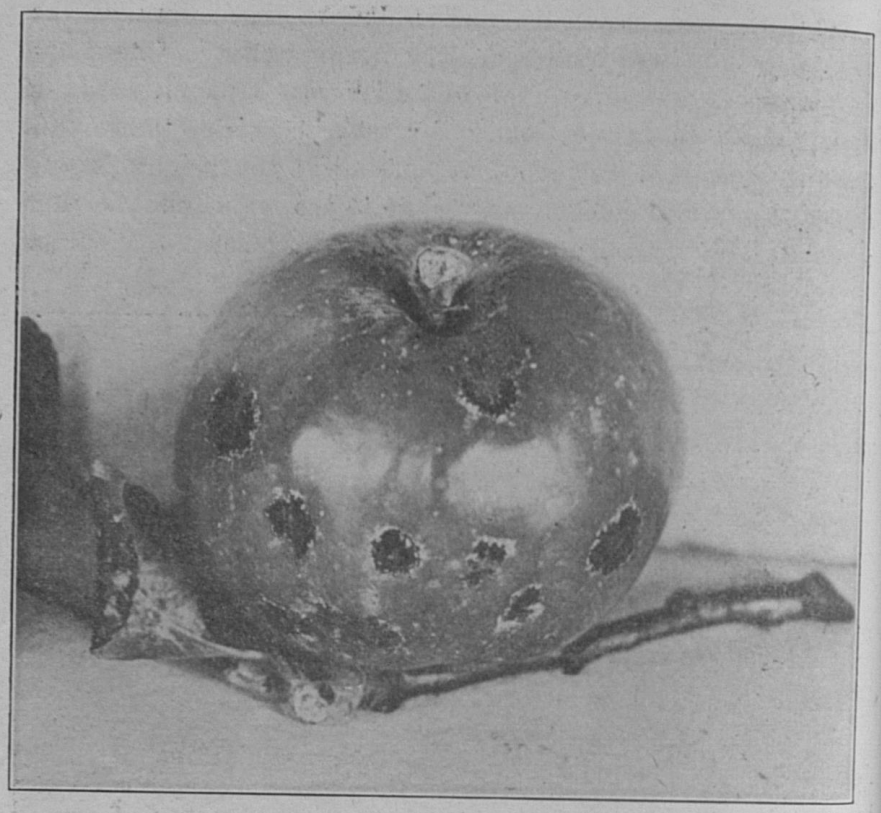

Figure VI. Apple scab.

time a combined spray of 1¼ gallons of commercial lime sulfur to 50 gallons of water for the apple scab with the addition of 1½ pounds of powdered arsenate of lead for the codling moth, or apple worm. The second combined spray followed two weeks later and consisted of arsenate of lead for the codling moth and Bordeaux mixture* for the apple blotch diseases.

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*Bordeaux Mixture 3-4-50.

1. Dissolve 3 pounds of bluestone in a wooden or "granite ware" bucket of hot water by suspending the bluestone in a cloth sack so it will hang a couple of inches into the water.

2. Slake 4 pounds of good stone lime, dilute and strain it into the spray tank or barrel and add about 30 gallons of water.

3. Dilute the bluestone solution with 8 or 10 gallons of water and add to the tank of lime water, stirring well as this is done, finally adding water enough to make 50 gallons in all. Apply at once.

If much spraying is to be done, it is often more convenient to make up in advance separate stock solutions of both bluestone and lime at the rate of one pound to each gallon of water. If these stock solutions are kept covered to prevent evaporation, they can be kept for weeks ready for quick dilution and mixing, as needed.

Bordeaux mixture should always be used when fresh.

This spray was followed two weeks later by Bordeaux mixture alone for apple blotch, since infection from this disease continued to spread during this time. The last spray was applied about the middle of July, and consisted of arsenate of lead and Bordeaux mixture to check the second brood of codling moth, as well as apple blotch and late rots.

COST OF RENOVATION.

The owners of the orchards kept a record of the cost of all operations, as tabulated on page 15. This included 6 per cent interest on value of land; labor at 30c an hour for man and 20c per hour for horse; cost of pruning, spraying, cultivation, harvesting and selling the fruit; 10 per cent for depreciation on spray outfit and pruning tools; and 40 per cent of the value of manure at $2.00 per ton and straw at $3.00 to $6.00 per ton.

The expense of pruning and cleaning up the orchards was the largest item of the cost. One orchard consisting of 83 trees required, with one man working, seven and one-half days to prune the trees, and five days to haul out the brush. The total number of trees in all orchards was 387 and the total cost of pruning and cleaning out the brush, $106.30, or $0.27 per tree.

The entire schedule of five sprays was followed in three orchards, four applications were made in three orchards, and three in the seventh. Frequent rains occurred during the season of spraying, which delayed the general farm work, and when conditions were just right for spraying, the farmer, in some cases, considered the planting of other crops more important. This prevented the full spray schedule being carried out in four orchards.

RETURNS FROM THE ORCHARDS.

The number of trees bearing fruit was 285, or 63.3 per cent of the total number of trees in all seven orchards. Late spring frosts which occurred when the trees were blooming reduced the set of fruit considerably. Cool, cloudy weather prevailing thruout the blooming season, largely prevented the bees from

visiting the flowers for cross pollination, and had much to do with the failure of many blossoms to set fruit.

The total yield was 648.2 bushels, which does not include about 125 bushels that were made into 300 gallons of vinegar in the McCoy orchard. The gross return was $1,086.07. An average price per bushel of $1.56 was received for the apples, orchard run, and 25 cents per gallon was allowed for the vinegar.

PROFITS.

The total cost of production was $492.72, leaving a net profit of $593.35. Averaging the total number of trees (387) both productive and non-productive:

The cost per tree was	$1.27
The net profit per tree was	1.53

GENERAL RESULTS.

The quantity of clean fruit produced this first year was larger than expected, considering the number of rains that occurred during the season of spraying and the condition of many of the trees. Most of the orchards contained varieties such as Yellow Transparent, Ben Davis, and Maiden Blush which are very susceptible to the apple blotch disease. This disease spreads very rapidly during damp weather from the blotch cankers on the limbs to the fruit. Many of the trees were so badly infested with these cankers that it was impracticable to cut out all diseased branches and those that were left were a source of infection. Some additional applications of Bordeaux are necessary to fully control this disease but were not made as they should have been since it was difficult to convince the men, who were having their first experience in spraying, that such extra applications were important.

The percentage of imperfect fruit, however, on the Yellow Transparent in two of the orchards, did not exceed one per cent, and the apples sold on the local market for an average of $3.00 per bushel. The apples from two Winesap trees, treated and untreated were picked, graded and weighed at harvest time. The treated tree yielded 117 pounds of market-

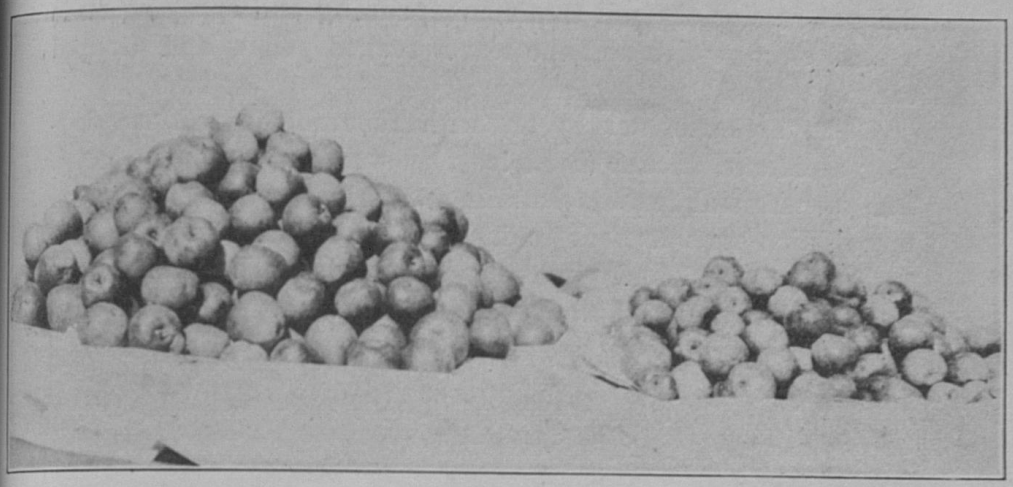

Figure VII. Yield from treated Winesap tree. Marketable, 117 lbs.; culls, 31 lbs.

able fruit and 31 pounds of culls; the untreated one yielded 1 pound (five apples) of marketable fruit and 31 pounds of culls. The trees were growing twenty-five feet apart, under like conditions, with the exception of differences in orchard management. The control of the codling moth, apple scab and late rots was exceedingly good on all varieties.

Figure VIII. Yield from untreated Winesap tree. Marketable, 1 lb. (5 apples); culls, 31 lbs.

The apples on the untreated trees were badly affected and began dropping early; before harvest most of them had fallen and were unfit for table or market use. The foliage on the treated trees was of a dark green color late in the season and the twig growth was good. On the other hand, the trees that

did not receive the soil treatment, pruning and spraying made a poor twig growth and the leaves turned yellow and dropped early.

The orchards next year, with favorable conditions, barring accidents, should do at least as well and probably better. The owners and tenants handling these orchards all expressed the opinion that it pays to include the orchard in their general farm work, and gave the Horticultural Department assurance that the good work will be continued.

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ORCHARD RENOVATION
Cost Account Records

ORCHARDS					LABOR COSTS (Man and Horse)								Cost of Spray Materials							
						Spraying														
County	Name of Demonstrator	No. of Trees	No. of Trees Bearing.	Interest on Land.	Pruning and Cleaning of Orchard.	No. of Sprays.	Time in Hours.	Total.	Average Per Tree.	Mulch and Fertilizers.	Harvesting.	Marketing.	Total.	Average Per Tree.	Equipment Depreciation (10 Per Cent.)	Mulch and Manurial Value (40 Per Cent.)	Yield in Bushels.	Total Receipts	Total Cost of Production.	Net Profits.
Breckenridge	Dr. Spire	47	27	$6.00	$9.40	4	18	$9.00	0.19	$1.50	$4.00		$12.81	$0.27	$1.50	$4.00	88	$99.22	$48.21	$51.01
Breckenridge	Jas. McCoy	83	83	2.40	37.50	5	66	27.80	0.34	Disking 3.00	18.00		27.39	0.33	2.10		74 Vinegar 300 gals.	102.00 75.00	118.19	58.81
Breckenridge	T. L. Callahand	125	32	9.00	20.50	4	28	14.00	0.11	Working Ground 7.30	18.00	$4.50	14.82	0.12	1.60		163	198.35	89.72	108.63
Daviess	W. S. Wilson	18	18	2.06	4.50	3	11	5.50 a	0.30	5.40	6.00	4.50	2.59	0.14	1.03	4.40	71	162.00	35.98	126.02
McCracken	Dan Futrell	41	28	6.00	10.25	5	10	5.50 b	0.13	5.00	7.00	.84	8.86	0.22	2.70	10.90 x	70.5	156.50	57.05	99.45
Oldham	B. O. Stivers	39	39	1.20	6.15	5	28	13.00	0.33	10.50	9.00		13.50	0.35	1.64	17.20	139.7	192.00	72.19	119.81
Washington	Polin & Polin	34	18	9.00	18.00	4	16	7.20	0.21	6.00	12.00		10.50	0.21	2.68	6.00	42	101.00	71.38	29.62
Total		387	245 63.3%		$106.30			$82.00			$74.00		$90.47				648.2	$1,086.07	$492.72	$593.35
																Average per tree (387 tree basis)		$2.80	$1.27	$1.53

x—Included cost of nitrate of soda.
a—Bucket spray pump used.
b—Power sprayer used.