

*Cost of Producing*

**APPLES and PEARS**  
**IN THE HOOD RIVER VALLEY, OREGON**

GUSTAV W. KUHLMAN

JOHN H. BLOSSER

D. CURTIS MUMFORD



Oregon State System of Higher Education  
Agricultural Experiment Station  
Oregon State College  
Corvallis

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## FOREWORD

This bulletin reports the estimated costs of producing apples and pears at Hood River with average yields (1940-42) and 1943 prices of materials and labor. It supplements Station Bulletin 420, *Man Labor Requirements for Apples and Pears in the Hood River Valley, Oregon*. It presents cost data for the same orchards that were included in the former publication.

To the fruit grower cost of production data are always important. A thorough knowledge and understanding of costs is especially important under wartime conditions with prices of fruit considerably higher than normal.

Cost figures in terms of dollars and cents go out of date very rapidly. On the other hand, if the basic data include the physical items as well as the money costs, the costs may be revised from year to year on the basis of current yields, wage rates, and prices of materials.

WM. A. SCHOENFELD, Director  
Oregon Agricultural Experiment Station

*Cover picture by courtesy of Leroy Childs, Superintendent, Hood River Branch Experiment Station.*

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## SUMMARY

### SIZE OF ORCHARD

The average size of the orchards in this study was 31.4 acres per apple orchard, and 24.5 acres per pear orchard.

The estimated total capital investment in the apple enterprise averaged \$32,191 per farm or \$1,026 per acre of apple orchard, of which \$627 was for the orchard exclusive of buildings and working capital. Total capital for the pear enterprise averaged \$29,515 per farm or \$1,203 per acre of pear orchard, of which \$763 was for the orchard.

### COST OF PRODUCTION

The estimated cost of producing apples in the Hood River Valley with average yields (1940-42) and 1943 prices of materials and labor averaged \$438.91 per acre or \$1.55 per packed box when computed on the yield basis of 283 packed boxes per acre, exclusive of packing-house costs. The cost of producing pears with average yields (1940-42) and 1943 prices of materials and labor averaged \$363.37 per acre or \$1.31 per packed box when computed on the yield basis of 277 packed boxes per acre, exclusive of packing-house costs.

Cost of labor averaged \$270.32 per acre or 61.6 per cent of the total cost of producing apples, and \$168.85 per acre or 46.5 per cent of the total cost of producing pears.

Harvest labor cost on apples \$95.82 per acre, thinning \$61.80, and pruning work \$40.04, together comprised 73 per cent of the total cost of labor. Harvest labor cost on pears \$69.15 per acre, thinning \$15.41, and pruning work \$23.05, together comprised 64 per cent of the total cost of labor.

Irrigating the apple orchards cost an average of \$24.38 per acre, of which \$20.65 was for labor, \$2.69 for water, and \$1.04 for other expenses. Irrigating costs on pears averaged \$23.39 per acre, of which \$19.56 was for labor, \$2.94 for water, and 89 cents for other expenses.

Spray costs for apples averaged \$53.87 per acre, of which \$21.49 was for labor, \$21.38 for materials, and \$11 for other expense. Spray costs on pears averaged \$52.22 per acre, of which \$13.74 was for labor, \$26.27 for materials, and \$12.21 for other expenses.

Interest, computed at 5 per cent on the average valuation of \$1,026 per acre of apple orchard, was \$51.30 per acre. Interest on the average valuation of \$1,203 per acre of pears was \$60.16 per acre.

### ESTIMATING CURRENT COST

It is usually impracticable to repeat a cost study every year, but if production methods are not materially changed, and if cost items are presented in physical terms as well as in money terms, cost of production data are useful beyond the period in which the study was

## SUMMARY—(Continued)

made. With the aid of index numbers relating to major cost items, it is possible to make adjustments for any given year.

For example, the Bureau of Agricultural Economics, U. S. Department of Agriculture, publishes, quarterly, a series of farm wage rates for the State of Oregon. The same Bureau also publishes, monthly, a United States index of farm costs other than labor. In the case of this study, these government indexes, although they do not apply specifically to Hood River County, Oregon, nevertheless can be used quite satisfactorily from year to year in making adjustments in cost of production estimates to show the general trend in costs. With harvest labor requirements presented in terms of man hours, it is possible to make additional refinements in estimated costs in line with year to year changes in yield per acre.

The average costs of producing apples and pears in 1943 were much higher than the average estimated costs computed for the five-year (prewar) period 1935-39, reflecting in particular the large increase in the farm wage rates caused by the war (Table 1). In addition to the monetary increase in wages paid during the war period, growers generally estimated that the work done by the inexperienced help available was only about 75 per cent as efficient as the help normally obtained.

Table 1. ESTIMATED AVERAGE COST OF APPLE AND PEAR PRODUCTION IN THE HOOD RIVER VALLEY FOR 1935-39 AND FOR 1944; BASED ON THE 1943 COST DATA<sup>1</sup> ADJUSTED TO THE LEVEL OF FARM WAGE RATES AND OTHER FARM COSTS FOR THE YEARS INDICATED.

Item	Cost per acre			Cost per packed box <sup>2</sup>
	Labor	Other	Total	
<i>Apples</i>				
<i>Ratio (1943=100)<sup>3</sup></i>				
1935-39 .....	36	79	53	53
1944 .....	116	105	112	112
1935-39 .....	\$ 97.31	\$133.19	\$230.50	\$ .81
1943 <sup>3</sup> .....	270.32	168.59	438.91	1.55
1944 .....	313.57	177.02	490.59	1.73
<i>Pears</i>				
<i>Ratio (1943=100)<sup>3</sup></i>				
1935-39 .....	36	79	59	59
1944 .....	116	105	110	110
1935-39 .....	\$ 60.79	\$153.67	\$214.46	\$ .77
1943 <sup>3</sup> .....	168.85	194.52	363.37	1.31
1944 .....	195.87	204.25	400.12	1.44

<sup>1</sup>Based on 3-year average yield (1940-42) of farms studied.

<sup>2</sup>Based on an average yield of 283 packed boxes of apples and 277 packed boxes of pears, exclusive of all packing-house costs.

<sup>3</sup>Indicates relative cost in specified year compared to cost in 1943. Index of labor is based on Oregon farm wages per month without board as reported by the Bureau of Agricultural Economics, U. S. Department of Agriculture. The index for other cost items is based on the index of production costs (prices paid by farmers for commodities, interest, and taxes) as reported in *The Agricultural Situation* published monthly by the Bureau of Agricultural Economics, U. S. Department of Agriculture.

<sup>4</sup>This space may be used to calculate costs for any particular year.

# Cost of Producing Apples and Pears in the Hood River Valley, Oregon

By

GUSTAV W. KUHLMAN,<sup>1</sup> JOHN H. BLOSSER,<sup>2</sup> and  
D. CURTIS MUMFORD<sup>3</sup>

## INTRODUCTION<sup>4</sup>

**F**RUIT growers and distributors requested the Oregon Agricultural Experiment Station and Extension Service to obtain data on the labor requirements and on the total costs of producing apples and pears in the Hood River Valley. The study of man labor requirements for apple and pear production was reported in Station Bulletin 420.<sup>5</sup>

### Purpose

The purpose of the present survey was to obtain information from growers that would provide basic facts on yields and costs of production. This information, when carefully adjusted to reflect changes occurring in yields and in the price level of farm production costs, provides a basis whereby cost of production can be readily estimated for any given year.

### Method of study

In 1943 field survey schedules of the usual man labor required in all orchard operations were compiled for 44 representative apple and pear growers operating approximately 10 per cent of the apple and pear acreages in the Hood River Valley.

In 1944 supplementary schedules showing the wage rates, spray applications, capital investment, and all other costs for the year 1943 were compiled for 33 of the same orchards visited the previous year. The average wage rate paid in 1943 was applied to the average man labor requirement per acre reported in Station Bulletin 420 to arrive

<sup>1</sup>Associate Economist, Department of Farm Management, Agricultural Experiment Station.

<sup>2</sup>Formerly Research Assistant, Oregon Agricultural Experiment Station.

<sup>3</sup>Head of Department of Farm Management, Division of Agricultural Economics, Oregon Agricultural Experiment Station.

<sup>4</sup>ACKNOWLEDGMENTS: This study was made possible through the cooperation and help of growers who contributed their data, and the assistance of A. L. Marble, County Agricultural Agent of Hood River County; Leroy Childs, Superintendent, and G. G. Brown, Horticulturist, respectively, of the Hood River Branch Experiment Station; J. E. Klahre, General Manager, Hood River Apple Growers Association; and E. R. Pooley of American Fruit Growers, Inc., and Duckwall Bros., independent shippers in the area.

<sup>5</sup>John H. Blosser, Earl Franklin, and D. Curtis Mumford, *Man Labor Requirements for Apples and Pears in the Hood River Valley, Oregon*, Oregon Agricultural Experiment Station Bulletin 420, July 1944.

at the cost of labor. All other costs were taken directly for the year 1943. Costs per ton and per packed box were calculated by dividing the total cost per acre by the three-year average yield (1940-42).

The orchards in this area typically have trees of varying ages ranging from a year or less up to maturity as replacements have been made. As the practice of replacement followed in this area serves to perpetuate the orchards almost indefinitely, depreciation on orchard investment was not included in computing the cost of producing fruit.

Since a division of the area in each orchard tract studied on the basis of bearing and nonbearing trees was impracticable, the cost of production reported herein is the average-acre cost of the entire plantings in the study. Thus the man-hours-per-average-acre (see Tables 5 and 11) is a figure that is applicable to the entire acreage of a crop within an area such as a county, and indicates the average amount of labor that may be required per acre for all of the acreage in that crop in the area even though each acre may not have been covered by every operation. The same holds true of the other items of cost.

### Area studied<sup>1</sup>

Hood River Valley contains most of the farming land in Hood River County. The valley lies in the northeastern part of the county and is approximately 20 miles long and from 5 to 10 miles wide. It consists of a series of plateaulike flats, lying at elevations from 100 to 500 feet above the beds of the streams, and is enclosed by steep mountains and hills. It is divided into three topographic divisions, known as the Upper, Middle, and Lower valleys. The agricultural lands of the valley are devoted primarily to commercial apple and pear production.

Though some variation occurs in the soils of this area, they are mainly of the Hood River, Parkdale, Underwood, and Wind River series, ranging in texture from sandy loam to silt loam.

Most of the apple and pear acreages are found on the hilly land. Since the elevation of the orchard lands varies from approximately 500 feet above sea level at the lower or northern end of the valley to 1,500 feet in the upper part of the valley, elevation influences the period of performing various operations. It also influences the total amount of labor required. This is particularly noticeable in the upper section of the valley where the higher elevation makes the

<sup>1</sup>A. T. Strahorn and E. B. Watson, *Soil Survey of the Hood River-White Salmon River Area, Oregon-Washington*, United States Department of Agriculture, 1914.

growing season considerably shorter. For this reason fewer sprays are needed than in the area near the Columbia River.

### THE APPLE ENTERPRISE

Nearly half of the total commercial bearing apple acreage of Oregon is located in Hood River County.<sup>1</sup> The concentration of apple acreage in this county is mainly due to the favorable climatic conditions, the adaptability of the hill-land soils, and the supply of irrigation water. During the past few years only slight changes have occurred in the total apple acreage in this county.

#### Land use

Eighty-six per cent of the cropland on the 16 apple-producing farms studied was in orchard (Table 2). Apple trees occupied 31.4 acres per farm or more than half of the total farm acreage. Fifteen of the 16 farms had pears also, averaging more than 14 acres per farm.

Table 2. APPLE FARMS: UTILIZATION OF THE LAND ON 16 FARMS STUDIED; HOOD RIVER VALLEY, OREGON, 1943.

Land use	Number of farms	Acreage per farm reporting	Average acreage per farm	Percentage of total farm area
Apples .....	16	<i>Acres</i> 31.4	<i>Acres</i> 31.4	<i>Per cent</i> 51.6
Pears .....	15	14.6	13.7	22.5
Cherries .....	8	2.9	1.5	2.4
Other cropland .....	11	10.7	7.3	12.0
Nontillable .....	10	11.3	7.0	11.5
TOTAL .....	16	.....	60.9	100.0

#### Capital investment

The total capital investment in land and buildings, based on the conservative estimates made by each grower interviewed, averaged \$41,514 per farm or \$682 per acre (Table 3). Land comprised 76 per cent of the total value of real estate, and buildings 24 per cent. It will be noted that these figures apply to the whole farm regardless of how the land was used.

<sup>1</sup>In 1942 the total commercial bearing apple acreage in Oregon was 9,200 acres of which 4,500 acres were in Hood River County. In 1943 the total commercial bearing apple acreage in Oregon was 9,000 acres of which 4,600 were in Hood River County. M. D. Thomas, L. R. Breithaupt, and N. I. Nielsen, *Oregon's Tree Fruit and Nut Crops 1910-1943*, Oregon Extension Bulletin 631, January 1944.



Table 3. APPLE FARMS: SIZE AND DISTRIBUTION OF CAPITAL INVESTMENT IN REAL ESTATE PER FARM AND PER ACRE; HOOD RIVER VALLEY, OREGON, 1943.

Item	Value of capital investment		Percent- age of total capital
	Total per farm	Average per acre	
Apple acreage .....	\$19,670	\$627	<i>Per cent</i> 47.4
Pear acreage .....	9,131	666	22.0
Cherry acreage .....	994	682	2.4
Other cropland .....	1,425	194	3.4
Nonillable land .....	314	45	.8
All land .....	\$31,534	\$518	76.0
All buildings .....	\$ 9,980	\$164	24.0
TOTAL FARM .....	\$41,514	\$682	100.0

The apple enterprise itself on each of the 16 orchards studied represented an average investment of \$32,191 per orchard or \$1,026 per acre (Table 4). Of this amount, the land actually in apples was valued at \$627 per acre. The share of the investment in buildings, machinery, and operating cash chargeable to the apple enterprise averaged \$399 per acre. It will be noted that the foregoing investment does not include whatever investment the owner might have had in pear orchards or other enterprises.

### COST OF PRODUCTION

The cost of producing apples, with average yields (1940-42) and 1943 prices of materials and labor, in 1943 on 16 orchards containing 502 acres was \$438.91 per acre, \$46.37 per ton, or \$1.55 per packed box, exclusive of packing costs (Table 5).

#### Labor

The cost of labor was \$270.32 per acre or 61.6 per cent of the total cost of apple production in 1943. The average labor requirement per acre was 404 hours including 23 hours general and supervision. The wage rate, including value of living facilities furnished the hired help, averaged 67¢ per hour.

#### Materials

Cost of orchard materials was \$45.33 per acre or 10.3 per cent of total costs. Spray materials and fertilizers comprised nearly 80 per cent of this amount.

#### General expense

General expenses, including repairs, motor fuels, insurance, and taxes, aggregated \$54.38 per acre or 12.4 per cent of all costs.

### Depreciation

The cost for depreciation of the equipment chargeable to apples was \$17.58 per acre or 4 per cent of the total cost of production.

### Interest

The interest, charged at 5 per cent on capital investment in orchard, equipment, and cash for operating, was \$51.30 per acre or 11.7 per cent of the total cost of producing apples.

Table 4. APPLE ORCHARD INVESTMENT: AVERAGE VALUE OF CAPITAL INVESTED IN 16 ORCHARDS STUDIED; HOOD RIVER VALLEY, OREGON, 1943.

Item	Value per orchard	Value per acre
Orchard .....	\$19,670	\$ 627
Housing .....	3,165	101
Other buildings .....	1,184	38
Machinery .....	466	15
Tractor .....	829	26
Sprayer .....	682	22
Automobile and truck .....	791	25
Cash for operating .....	5,404	172
TOTAL .....	\$32,191	\$1,026

### FIXED AND VARIABLE COSTS

Some items of cost are quite fixed regardless of production, while others vary more or less with the size of the crop obtained (Table 6). Groupings of costs are, of course, somewhat arbitrary and therefore should be regarded only as rough approximations.

#### Fixed costs

As the orchard, buildings, and machinery usually constitute an operating unit, such costs as depreciation of equipment, interest on the investment, and taxes on the property cannot readily be shifted to some other enterprise in case of a crop failure. These items are designated as fixed costs.

#### Semifixed costs

Semifixed costs include farm motor fuels, repairs on equipment and buildings, costs of tree replacements, interest on cash required for current expense payments, fire and liability insurance premiums, telephone, and other miscellaneous items. These costs can be only partly postponed or shifted in case of crop failure, either because they are incurred before crop prospects are known or because some orchard maintenance seems essential for future production.

Table 5. APPLES: ITEMIZED COSTS PER AVERAGE ACRE, PER TON, AND PER PACKED-BOX BASIS; HOOD RIVER VALLEY, OREGON, WITH AVERAGE YIELDS (1940-42) AND 1943 PRICES OF MATERIALS AND LABOR.<sup>1</sup>

For 502 acres in 16 orchards producing 273,088 loose boxes (34.8 pounds), an average yield of 544 boxes or 9½ tons per acre.

Item	Cost per acre	Cost per ton	Cost per box <sup>2</sup>	Percentage of cost
<i>Labor</i>				<i>Per cent</i>
Pruning (47.2 hours per average acre) .....	\$ 33.04	\$ 3.49	11.7¢	7.5
Brush removal (10 hours per average acre) ..	7.00	.74	2.5	1.6
Fertilizing (4.2 hours per average acre) .....	2.94	.31	1.0	.7
Cultivating (7.5 hours per average acre) .....	5.25	.56	1.9	1.2
Irrigating (29.5 hours per average acre) .....	20.65	2.18	7.3	4.7
Spraying (30.7 hours per average acre) .....	21.49	2.27	7.5	4.9
Thinning (103 hours per average acre) .....	61.80	6.53	21.9	14.1
Propping (8.7 hours per average acre) .....	6.09	.64	2.2	1.4
Picking (109.2 hours per average acre) .....	74.26	7.84	26.3	16.9
Other harvesting (30.8 hours per average acre)	21.56	2.28	7.6	4.9
Miscellaneous labor (23.2 hours per average acre)	16.24	1.72	5.7	3.7
TOTAL LABOR (404 hours per average acre) ..	\$270.32	\$28.56	95.6¢	61.6
<i>Materials</i>				
Fertilizers .....	\$14.16	\$1.50	5.0¢	3.2
Irrigation water .....	2.69	.28	1.0	.6
Sprays .....	21.38	2.26	7.5	4.9
Props, wire, etc. ....	2.47	.26	.9	.6
Picking bags .....	.55	.06	.2	.1
Ladders .....	.94	.10	.3	.2
Lugs .....	3.14	.33	1.1	.7
TOTAL MATERIALS .....	\$45.33	\$4.79	16.0¢	10.3
<i>General expense</i>				
Machinery repair .....	\$10.15	\$1.07	3.6¢	2.3
Motor fuel .....	11.28	1.19	4.0	2.6
Building repair .....	3.72	.39	1.3	.8
Electricity and water .....	1.84	.19	.6	.4
Tree replacement .....	6.31	.67	2.2	1.4
Fire insurance .....	1.29	.14	.5	.3
Liability insurance .....	7.50	.79	2.6	1.7
Telephone and office .....	1.67	.18	.6	.4
Taxes .....	6.80	.72	2.4	1.6
Other and miscellaneous .....	3.82	.40	1.4	.9
TOTAL GENERAL EXPENSE .....	\$54.38	\$5.74	19.2¢	12.4
<i>Depreciation</i>				
Machinery .....	\$12.04	\$1.27	4.2¢	2.7
Buildings .....	5.54	.59	2.0	1.3
TOTAL DEPRECIATION .....	\$17.58	\$1.86	6.2¢	4.0
<i>Interest at 5%</i>				
Machinery .....	\$ 4.41	\$ .47	1.6¢	1.0
Buildings .....	6.93	.73	2.4	1.6
Cash for operating .....	3.61	.91	3.0	2.0
Orchard .....	31.35	3.31	11.1	7.1
TOTAL INTEREST .....	\$51.30	\$5.42	18.1¢	11.7
TOTAL COST .....	\$438.91	\$46.37	155.1¢	100.0

<sup>1</sup>Includes all costs, delivered to the packing house or cannery door. For explanation of "average-acre" see discussion under *Method of Study* on pages 7 and 8.

<sup>2</sup>The number of packed boxes was computed as 52 per cent of the loose boxes or 283 packed boxes per acre.

### Variable costs

Variable costs include labor and such materials as sprays, fertilizers, irrigation water, props, wire, and harvesting equipment. A considerable proportion of these costs would generally be eliminated during a year of crop failure.

### MAJOR OPERATIONS

The cost of labor per acre, as reported in this study, was obtained by multiplying the average of the number of hours usually required for each operation on the total acreage studied by the average wage rate paid or estimated by the growers for the work done. Thus the data are applicable to the entire acreage of a crop within an area such as a county, and indicate the average amount of labor that may be required per acre for all of the acreage of that crop even though each acre may not have been covered by every operation.

Table 6. APPLES: FIXED AND VARIABLE COSTS, HOOD RIVER VALLEY, OREGON, WITH AVERAGE YIELDS (1940-42) AND 1943 PRICES OF MATERIALS AND LABOR.  
(Yield per acre computed as  $9\frac{1}{2}$  tons or 283 packed boxes)<sup>1</sup>

Item	Cost per acre	Cost per ton	Cost per box	Percent- age of total cost
<i>Fixed costs</i>				<i>Per cent</i>
Depreciation, interest, taxes .....	\$ 67.07	\$ 6.62	\$ .23	15.3
<i>Semifixed costs</i>				
Maintenance and miscellaneous .....	56.19	6.40	.20	12.8
<i>Variable costs</i>				
Labor and materials .....	315.65	33.35	1.12	71.9
TOTAL COST .....	\$438.91	\$46.37	\$1.55	100.0

<sup>1</sup>See second footnote Table 5.

Harvesting, thinning, and spraying were the three largest cost operations in apple production, averaging \$219.84 per acre or half of the total cost (Table 7). Pruning, irrigating, fertilizing, and miscellaneous labor were other major operating costs.

### Soil management

Nearly all growers have some cover crop in their orchard, consisting mainly of such crops as alfalfa, sweet clover, and perennial orchard grasses. Only about 12 per cent of the acreage required re-seeding the year of the study, indicating the tendency of those plants to continue satisfactorily over a period of years. Irrigation and commercial fertilizers, of course, stimulate a heavy growth of cover crop.

Table 7. APPLES: COST OF LABOR, MATERIALS, AND OTHER EXPENSE ITEMS PER ACRE;  
BY FIELD OPERATIONS, HOOD RIVER VALLEY, OREGON, 1943.<sup>1</sup>  
(Three-year average, 1940-42, yield per acre computed as 9.5 tons)

Item	Labor	Materials	Other expense	Total cost
Pruning .....	\$ 33.04	\$ .....	\$ .....	\$ 33.04
Brush removal .....	7.00	.....	1.15	8.15
Tree replacement .....	.....	.....	6.31	6.31
Fertilizing .....	2.94	14.16	.50	17.60
Cultivating .....	5.25	.....	3.12	8.37
Irrigating .....	20.65	2.69	1.04	24.38
Spraying .....	21.49	21.38	11.00	53.87
Thinning .....	61.80	.....	.....	61.80
Propping .....	6.09	2.47	1.03	9.59
Picking .....	74.26	4.63	.....	78.89
Other harvest .....	21.56	.....	3.72	25.28
Other miscellaneous labor .....	16.24	.....	21.54	37.78
Other miscellaneous equipment .....	.....	.....	5.28	5.28
Automobile and truck .....	.....	.....	13.70	13.70
Building expense .....	.....	.....	8.11	8.11
Taxes .....	.....	.....	6.30	6.30
Interest on cash for operating .....	.....	.....	8.61	8.61
Interest on orchard investment at 5% <sup>2</sup> .....	.....	.....	31.35	31.35
TOTAL COST PER ACRE .....	\$270.32	\$45.33	\$123.26	\$438.91
Percentage of the cost .....	61.6%	10.3%	28.1%	100.0%

<sup>1</sup>Based on three-year average yield (1940-42) and does not include packing-house costs (boxes, etc.).

<sup>2</sup>Interest on capital invested in buildings and machinery is included under various items.

### Spraying<sup>3</sup>

The 16 apple orchards studied were sprayed from 4 to 7 times, averaging 5 times over the entire acreage in 1943. Four were sprayed only 4 times each; 4 were sprayed 5 times; 6 were sprayed 6 times; and 2 were sprayed 7 times. All the orchards except 1 received the dormant spray. Only 2 orchards received the "pink stage" spray. All received the calyx spray. Only 3 orchards received less than 3 cover sprays; 10 received less than 4 cover sprays. Two orchards received the fifth cover spray, and only 1 was sprayed later, in August.

### Volume of sprays

The average amount of spray applied during the season was estimated at 3,700 gallons per acre or 740 gallons per application. The rate increased as the season advanced. The average amount of dormant spray used was approximately 600 gallons per acre; the calyx spray 717 gallons; first cover, 788 gallons; and second cover 813 gallons. The amount of spray required varies, of course, with the practice followed. Some growers spray carefully in order to conserve materials while others spray liberally to assure reaching every por-

<sup>3</sup>For discussion of spray program see Oregon Extension Bulletin 584, *Oregon Apple and Pear Spray Program*, January 1942.

tion of the tree. Six growers with the highest costs per acre for spray materials applied an average of 1,370 gallons per acre and had an average cost of \$42.60 per acre for spray materials during the season.

### **Tree maintenance**

Orchard maintenance consists of annual pruning, the occasional replacing of weak or undesirable trees, and the replanting of blocks of the orchard as the trees become unprofitable.

The amount of pruning varies with the age and condition of the trees. Pruning was deferred to some extent during the depression years when income was low and again in some cases during the war period when labor was scarce.

The cost of tree replacement was based on the growers' estimate of the expense of taking out the old tree and getting a new one planted, and the extra work required until the new tree is permanently established.

Maintenance of trees may be affected somewhat by the amount of attention given them while they are heavily loaded with fruit. Some growers use props freely to support heavily laden branches and thus reduce the danger of breakage, particularly where wind also is a serious factor. Other growers depend chiefly on use of wire to support main branches and use of twine for smaller limbs. A few growers stated that proper pruning eliminated any major need for props or wire supports.

### **Thinning**

Removal of a portion of the apples from the trees early in the season, to insure satisfactory size and quality of fruit, requires a large amount of hand labor. The amount of thinning required varies with different varieties as well as with the season. One grower did no thinning the year of the study, while 3 growers averaged 255 hours per acre on this work.

### **Harvesting**

Picking required 109 hours per acre. The average rate of picking apples in all orchards, including the time of men, women and youths, was about 5 loose boxes per hour.

## **THE PEAR ENTERPRISE**

Pears in Hood River County are practically as important as apples from the standpoint of present commercial bearing acreages. From the standpoint of the entire state, however, the present com-

mercial bearing acreage of pears in Hood River County is only about one-fourth of the state's total.<sup>1</sup> The severe freeze of 1919-20, which damaged several thousand acres of apples, resulted in an important shift to pears. The acreage has been increasing gradually during the past few years.

### Land use

Eighty-seven per cent of the cropland on the 17 pear-producing farms studied was in orchard (Table 8). Pear trees occupied 24.5 acres per farm or more than one-third of the total farm acreage. Thirteen of the 17 farms had apples also, averaging nearly 22 acres per farm.

### Capital investment

The total capital investment in land and buildings, based on the conservative estimates made by the growers, averaged \$43,253 per farm or \$609 per acre (Table 9). Land comprised 76 per cent of the total value of real estate, and buildings 24 per cent. It will be noted that these figures apply to the whole farm regardless of how the land was used.

The pear enterprise itself on each of the 17 orchards studied represented an average investment of \$29,515 per orchard or \$1,203 per acre (Table 10). Of this amount, the land actually in pears was valued at \$763 per acre. The share of the investment in buildings, machinery, and operating cash chargeable to the pear enterprise averaged \$440 per acre. It will be noted that the foregoing investment does not include whatever investment the owner might have had in apple orchards or other enterprises.

Table 8. PEAR FARMS: UTILIZATION OF THE LAND ON 17 FARMS STUDIED; HOOD RIVER VALLEY, OREGON, 1943.

Land use	Number of farms	Acreage per farm reporting	Average acreage per farm	Percentage of total farm area
Pears .....	17	<i>Acres</i> 24.5	<i>Acres</i> 24.5	<i>Per cent</i> 34.5
Apples .....	13	21.6	16.5	23.3
Cherries .....	8	8.2	3.9	5.5
Other cropland .....	10	11.7	6.9	9.7
Nontillable .....	12	27.2	19.2	27.0
TOTAL .....	17	.....	71.0	100.0

<sup>1</sup>In 1942 the total commercial pear bearing acreage in Oregon was 16,700 of which 4,100 acres were in Hood River County. In 1943 there were 16,900 acres in Oregon of which 4,300 acres were in Hood River County. Jackson is the leading commercial pear-producing county in Oregon and in 1943 had 10,000 commercial bearing acres. M. D. Thomas, L. R. Breithaupt, and N. I. Nielsen, *Oregon's Tree Fruit and Nut Crops 1910-1943*, Oregon State College Extension Bulletin 631, January 1944.

Table 9. PEAR FARMS: SIZE AND DISTRIBUTION OF CAPITAL INVESTMENT IN REAL ESTATE PER FARM AND PER ACRE; HOOD RIVER VALLEY, OREGON, 1943.

Item	Value of capital investment		Percentage of total capital
	Total per farm	Average per acre	
Pear acreage .....	\$18,724	\$763	<i>Per cent</i> 43.3
Apple acreage .....	9,441	572	21.8
Cherry acreage .....	2,647	679	6.1
Other cropland .....	900	131	2.1
Nontillable land .....	989	51	2.3
All land .....	\$32,701	\$461	75.6
All buildings .....	\$10,552	\$148	24.4
TOTAL FARM .....	\$43,253	\$609	100.0

Table 10. PEAR ORCHARD INVESTMENT: AVERAGE VALUE OF CAPITAL INVESTED IN 17 ORCHARDS STUDIED; HOOD RIVER VALLEY, OREGON, 1943.

Item	Value per orchard	Value per acre
Orchard .....	\$18,724	\$ 763
Housing .....	3,153	129
Other buildings .....	1,662	68
Machinery .....	456	19
Tractor .....	527	21
Sprayer .....	627	26
Auto and truck .....	747	30
Cash for operating .....	3,619	147
TOTAL .....	\$29,515	\$1,203

### COST OF PRODUCTION

The cost of producing pears with average yields (1940-42) and 1943 prices of materials and labor, on 17 orchards containing 417 acres was \$363.37 per acre, \$44.14 per ton, or \$1.31 per packed box, exclusive of packing costs (Table 11).

#### Labor

The cost of labor was \$168.85 per acre or 46.5 per cent of the total cost of pear production in 1943. The average labor requirement per acre was 252 hours, including 17 hours general and supervision. The wage rate, including the value of living facilities furnished to hired help, averaged 67¢ per hour.

#### Materials

Cost of orchard materials was \$58.03 per acre or 16 per cent of total costs. Spray materials and fertilizers comprised nearly 75 per cent of this amount.



**General expense**

General expense, including repairs, motor fuels, insurance, and taxes, aggregated \$56.45 per acre or 15.5 per cent of all costs.

**Depreciation**

The cost for depreciation of the equipment chargeable to pears was \$19.88 per acre or 5.5 per cent of total cost of production.

**Interest**

The interest, charged at 5 per cent on capital investment in orchard, equipment, and cash for operating, was \$60.16 per acre or 16.5 per cent of the total cost of producing pears.

**FIXED AND VARIABLE COSTS**

Some items of cost are quite fixed regardless of production, while others vary more or less with the size of the crop obtained (Table 12). The basis for making this grouping of costs is discussed in the previous section on apples.

**MAJOR OPERATIONS**

The cost of labor per acre, as reported in this study, was obtained by multiplying the average of the number of hours usually required for each operation on the total acreage studied by the average wage rate paid or estimated by the growers for the work done. Thus the data are applicable to the entire acreage of a crop within an area such as a county, and indicate the average amount of labor that may be required per acre for all of the acreage of that crop even though each acre may not have been covered by each operation.

Harvesting and spraying were the two largest cost operations in pear production, averaging \$129.23 per acre or 35 per cent of the total cost (Table 13). Pruning, irrigating, fertilizing, and miscellaneous labor were other major operating costs.

**Soil management**

Nearly all growers have some cover crop in their orchard, consisting mainly of such crops as alfalfa, sweet clover, and perennial orchard grasses. Only about 12 per cent of the acreage required reseeded the year of the study, indicating the tendency of those plants to continue satisfactorily over a period of years. Irrigation and commercial fertilizers, of course, stimulate a heavy growth of cover crop.

# PRODUCING APPLES AND PEARS IN THE HOOD RIVER VALLEY 19

Table 11. PEARS: ITEMIZED COSTS PER AVERAGE ACRE, PER TON, AND PER PACKED-BOX BASIS; HOOD RIVER VALLEY, OREGON, WITH AVERAGE YIELDS (1940-42) AND 1943 PRICES OF MATERIALS AND LABOR.<sup>1</sup>

For 417 acres in 17 orchards producing 175,140 loose boxes (39.2 pounds),  
an average yield of 420 boxes or 8.23 tons per acre.

Item	Cost per acre	Cost per ton	Cost per box <sup>2</sup>	Percent- age of cost
<i>Labor</i>				<i>Per cent</i>
Pruning (27.7 hours per average acre) .....	\$ 18.56	\$ 2.26	6.7¢	5.1
Brush removal (6.7 hours per average acre) ..	4.49	.55	1.6	1.3
Fertilizing (6.2 hours per average acre) .....	4.15	.50	1.5	1.1
Cultivating (6.9 hours per average acre) .....	4.62	.56	1.7	1.3
Irrigating (29.2 hours per average acre) .....	19.56	2.38	7.1	5.4
Spraying (20.5 hours per average acre) .....	13.74	1.67	5.0	3.8
Thinning (23.0 hours per average acre) .....	15.41	1.87	5.6	4.2
Propping (11.8 hours per average acre) .....	7.91	.96	2.8	2.2
Picking (82.0 hours per average acre) .....	54.94	6.67	19.8	15.1
Other harvesting (21.2 hours per average acre) .....	14.21	1.73	5.1	3.9
Miscellaneous labor (16.8 hours per average acre) .....	11.26	1.37	4.0	3.1
TOTAL LABOR (252 hours per average acre) .....	\$168.85	\$20.52	60.9¢	46.5
<i>Materials</i>				
Fertilizers .....	\$16.81	\$2.04	6.1¢	4.6
Irrigation water .....	2.94	.36	1.1	.8
Sprays .....	26.27	3.19	9.5	7.2
Props, wire, etc. ....	6.58	.80	2.4	1.8
Picking bags .....	.62	.08	.2	.2
Ladders .....	1.00	.12	.3	.3
Lugs .....	3.81	.46	1.4	1.1
TOTAL MATERIALS .....	\$58.03	\$7.05	21.0¢	16.0
<i>General expense</i>				
Machinery repair .....	\$10.71	\$1.30	3.9¢	2.9
Motor fuel .....	11.47	1.39	4.1	3.2
Building repair .....	5.61	.68	2.0	1.5
Electricity and water .....	2.67	.32	1.0	.7
Tree replacement .....	4.56	.55	1.6	1.3
Fire insurance .....	2.00	.24	.7	.6
Liability insurance .....	4.45	.54	1.6	1.2
Telephone and office .....	2.58	.31	.9	.7
Taxes .....	6.95	.84	2.5	1.9
Other and miscellaneous .....	5.45	.67	2.0	1.5
TOTAL GENERAL EXPENSE .....	\$56.45	\$6.84	20.3¢	15.5
<i>Depreciation</i>				
Machinery .....	\$12.70	\$1.54	4.6¢	3.5
Buildings .....	7.18	.88	2.6	2.0
TOTAL DEPRECIATION .....	\$19.88	\$2.42	7.2¢	5.5
<i>Interest at 5%</i>				
Machinery .....	\$ 4.80	\$ .58	1.7¢	1.3
Buildings .....	9.82	1.19	3.5	2.7
Cash for operating .....	7.38	.90	2.7	2.0
Orchard .....	38.16	4.64	13.8	10.5
TOTAL INTEREST .....	\$ 60.16	\$ 7.31	21.7¢	16.5
TOTAL COST .....	\$363.37	\$44.14	131.1¢	100.0

<sup>1</sup>Includes all costs, delivered to the packing house or cannery door. For explanation of "average-acre" see discussion under *Method of Study* on pages 7 and 8.

<sup>2</sup>The number of packed boxes was computed as 66 per cent of the loose boxes or 277 packed boxes per acre.

<sup>3</sup>The Bartlett pear was practically the only variety thinned. The thinning of Bartletts alone is estimated at 82.5 man hours per acre thinned or 59.4 hours per average acre.

Table 12. PEARS: FIXED AND VARIABLE COSTS, HOOD RIVER VALLEY, OREGON, WITH AVERAGE YIELDS (1940-42) AND 1943 PRICES OF MATERIALS AND LABOR.  
(Yield per acre computed as 8.23 tons or 277 packed boxes)<sup>1</sup>

Item	Cost per acre	Cost per ton	Cost per box	Percentage of total cost
<i>Fixed costs</i>				<i>Per cent</i>
Depreciation, interest, taxes .....	\$ 79.61	\$ 9.67	\$ .29	21.9
<i>Semifixed costs</i>				
Maintenance and miscellaneous .....	56.88	6.90	.20	15.6
<i>Variable costs</i>				
Labor and materials .....	226.88	27.57	.82	62.5
TOTAL COST .....	\$363.37	\$44.14	\$1.31	100.0

<sup>1</sup>See second footnote, Table 11.

Table 13. PEARS: COST OF LABOR, MATERIALS, AND OTHER EXPENSE ITEMS PER ACRE; BY FIELD OPERATIONS, HOOD RIVER VALLEY, OREGON, 1943.<sup>2</sup>  
(Three-year average, 1940-42, yield per acre computed as 8.23 tons)

Item	Labor	Materials	Other expense	Total cost
Pruning .....	\$ 18.56	.....	.....	\$ 18.56
Brush removal .....	4.49	.....	\$ 0.80	5.29
Tree replacement .....	.....	.....	4.56	4.56
Fertilizing .....	4.15	\$16.81	.56	21.52
Cultivating .....	4.62	.....	3.45	8.07
Irrigating .....	19.56	2.94	.89	23.39
Spraying .....	13.74	26.27	12.21	52.22
Thinning .....	15.41	.....	.....	15.41
Propping .....	7.91	6.58	1.08	15.57
Picking .....	54.94	5.43	.....	60.37
Other harvest .....	14.21	.....	2.43	16.64
Other miscellaneous labor .....	11.26	.....	23.43	34.69
Other miscellaneous equipment .....	.....	.....	5.85	5.85
Automobile and truck .....	.....	.....	15.73	15.73
Building expense .....	.....	.....	13.01	13.01
Taxes .....	.....	.....	6.95	6.95
Interest on cash for operating .....	.....	.....	7.38	7.38
Interest on orchard investment at 5% <sup>3</sup> .....	.....	.....	38.16	38.16
TOTAL COST PER ACRE .....	\$168.85	\$58.03	\$136.49	\$363.37
Percentage of the cost .....	46.5%	16.0%	37.5%	100.0%

<sup>2</sup>Based on three-year average yield (1940-42) and does not include packing-house costs (boxes, etc.).

<sup>3</sup>Interest on capital invested in buildings and machinery is included under various items.

## Spraying<sup>4</sup>

The 17 pear orchards studied were sprayed from 4 to 7 times, averaging 5.3 times over the entire acreage in 1943. One was sprayed only 3 times; 3 were sprayed 4 times each; 7 were sprayed 5 times; 5 were sprayed 6 times; and 1 was sprayed 7 times. All the orchards received the dormant spray. All except one received the "pink stage" spray and the calyx spray. Two orchards received

<sup>4</sup>For discussion of spray program see Oregon State College Extension Bulletin 584, *Oregon Apple and Pear Spray Program*, January 1942.

no cover sprays; 2 received 1 cover spray; 8 received 2 cover sprays; 4 received 3 cover sprays; and only 1 received 4 cover sprays in 1943. One orchard had a preharvest spray in addition to 2 cover sprays.

### **Volume of sprays**

The average amount of spray applied during the season was estimated at 3,800 gallons per acre or 720 gallons per application. The rate increased as the season advanced. The average amount of dormant spray used was approximately 700 gallons per acre; the calyx spray, 750 gallons; first cover, 723 gallons; and second cover, 800 gallons. The amount of spray required varies of course with the size of the trees but there are also differences resulting from experience and the practice followed. Some growers spray carefully in order to conserve materials while others spray liberally to assure reaching every portion of the tree. Five growers with the highest costs per acre for spray materials applied at an average rate of 1,000 gallons per acre and had an average cost of \$40.70 per acre for spray materials during the season.

### **Tree maintenance**

Orchard maintenance consists of annual pruning, the occasional replacing of weak or undesirable trees, and the replanting of blocks of the orchard as the trees become unprofitable.

The amount of pruning varies with the age and condition of the trees. Pruning was deferred to some extent during the depression years when income was low and again in some cases during the war period when labor was scarce.

The cost of tree replacement was based on the growers' estimate of the expense of taking out the old tree and getting a new one planted, and the extra work required until the new tree is permanently established.

Maintenance of the trees may be affected somewhat by the amount of attention given them while they are heavily loaded with fruit. Some growers use props freely to support heavily laden branches and thus reduce the danger of breakage, particularly where wind also is a serious factor. Other growers depend chiefly on use of wire to support main branches and use of twine for smaller limbs. A few growers stated that proper pruning eliminated any major need for props or wire supports.

### **Thinning**

Removal of a portion of the fruit from the trees early in the season, to insure satisfactory size and quality, requires a large

amount of hand labor. Thinning is essential principally with the Bartlett variety.

### **Harvesting**

Picking required 82 hours per acre. The average rate of picking pears in all orchards, including the time of men, women, and youths, was about 5 loose boxes per hour.