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

PROGRESS REPORT III

Gustav W. Kuhlman
Arthur E. Irish

Agricultural Experiment Station
Oregon State College
Corvallis

Circular of Information 486 June 1950

Cost of Producing

Apples and Pears

in the Hood River Valley, Oregon

PROGRESS REPORT III

Gustav W. Kuhlman, Agricultural Economist

Arthur E. Irish, Fieldman

This report is a summary of detailed cost records kept on 21 fruit farms in the Hood River Valley for the year 1949 with comparable data for 1947 and 1948. The cost of production includes all items of expense incurred in producing and delivering the crop to the door of the packing house or processing plant. No packing house costs are included. 1/

Apple Production Costs

The cost of producing apples in 1949 on 20 orchards averaged 78¢ per loose box and $1.24 per packed-box basis, exclusive of packing and storage costs (Table 1). Assuming packing and handling charges (from $1.25 to $1.50) the total F.O.B. cost would be $2.49 or more per packed box.

Table 1. APPLES: Cost of Production, Hood River Valley, Oregon, 1947-1949.
(Does not include cost of storage, boxes, packing, and shipping)

Item	Year 1947	Year 1948	Year 1949	3-year average	Percentage of average
Number of orchards in study	24	25	20	---	---
Acreage of apples per orchard	15.2	16.2	16.2	---	---
Yield per acre, loose boxes	542	572	568	561	---
Yield per acre, packed boxes	328	358	360	349	---
Costs per loose box for:	Cents	Cents	Cents	Cents	Per cent
Preharvest labor	33.1	29.1	24.2	28.8	33.4
Picking	12.5	12.5	9.5	11.5	13.3
Other harvest	6.9	5.7	5.1	5.9	6.8
Total labor	52.5	47.3	38.8	46.2	53.5
Materials	13.8	12.0	12.2	12.6	14.6
General expense	11.6	12.9	12.8	12.4	14.4
Depreciation on equipment	6.2	6.0	5.7	6.0	7.0
Interest on investment (5 per cent)	9.5	9.0	8.7	9.1	10.5
Total cost per loose box	93.6	87.2	78.2	86.3	100.0
Cost per packed-box basis*	154.4	139.4	123.5	139.1	---

* Growers received about $32 per ton (equivalent to 20 cents return per packed box grown) for the low-grade apples taken to the cannery.

The cost per box of apples produced in 1949 was about 10 per cent less than in 1948 with approximately the same yield per acre. See Table 2 for the labor requirements by operations and the itemized costs per acre for the apple orchards studied.

1/ Fruit growers, processors, and the Hood River Branch Experiment Station requested the Oregon Agricultural Experiment Station to conduct a cost project on representative orchards in the Hood River Valley. Arthur E. Irish of Hood River served as fieldman. The cooperating growers kept daily records on their respective enterprises.

Table 2. APPLE PRODUCTION COSTS, Hood River Valley, Oregon, 1947-1949.
(Does not include cost of storage, boxes, packing, and shipping)

Item	Man hours			Cost		
	1947	1948	1949	1947	1948	1949
Labor per acre						
Pruning	31.6	39.2	33.1	$ 29.71	$ 38.96	$ 31.52
Brush removal	5.8	6.8	5.2	5.63	6.72	4.60
Hand cultivating	2.6	3.5	1.1	2.27	3.18	.87
Machine cultivating	4.6	4.0	4.1	4.47	4.21	4.00
Fertilizing; mowing	2.4	1.5	1.7	2.29	1.58	1.61
Irrigating	20.0	11.2	11.2	19.35	11.67	11.12
Spraying	18.6	15.3	11.2	17.62	15.70	11.45
Thinning	43.4	49.5	30.4	37.15	43.02	26.68
Propping	9.6	6.5	4.8	8.81	6.49	4.48
Maintenance	31.7	20.8	25.0	31.07	22.10	26.05
Supervision	15.7	8.7	12.6	21.26	12.92	14.83
Total preharvest	186.0	167.0	140.4	$179.63	$166.55	$137.21
Picking	79.4	89.3	67.7	67.52	71.40	54.18
Other harvest	36.6	30.3	27.8	37.16	32.48	28.91
Total labor	302.0	286.6	235.9	$284.31	$270.43	$220.30
Materials per acre						
Fertilizers				$ 14.03	$ 14.61	$ 11.56
Irrigation water				5.53	5.20	6.11
Sprays				47.62	39.17	41.65
Miscellaneous supplies				7.83	9.61	9.98
Total materials				$ 75.01	$ 68.59	$ 69.30
General expense per acre						
Building repair				$ 4.79	$ 2.98	$ 3.32
Machinery repair				9.09	10.00	8.16
Machine hire				3.04	3.28	6.90
Gas and oil				9.40	12.09	11.61
Electricity; water; wood fuel; office				7.25	8.47	8.46
Liability, fire, and motor insurance				6.37	10.74	7.01
Property taxes				12.85	16.29	17.40
Cash to operate				10.00	10.00	10.00
Total general expense				$ 62.79	$ 73.85	$ 72.86
Depreciation per acre						
Buildings (not including operator's dwelling)				$ 12.67	$ 12.32	$ 10.27
Machinery				20.83	22.38	21.86
Total depreciation				$ 33.50	$ 34.70	$ 32.13
Interest per acre (5 per cent)						
Buildings				$ 9.67	$ 9.36	$ 8.84
Machinery				11.03	11.55	10.22
Orchard				30.69	30.59	30.61
Total interest				$ 51.39	$ 51.50	$ 49.67
Total cost per acre				$507.00	$499.07	$444.26
Cost per loose box				$ .94	$ .87	$ .78
Cost per packed box*				$ 1.54	$ 1.39	$ 1.24
Acres per orchard				15.2	16.2	16.2
Loose boxes produced per acre				542	572	568
Packed boxes produced per acre				328	358	360

*Growers received about $32 per ton (equivalent to 20 cents return per packed box grown) for the low-grade apples taken to the cannery.

Pear Production Costs

Winter pears

The cost of producing winter pears in 1949 on 21 orchards averaged 96¢ per lug box and $1.10 per packed-box basis, exclusive of packing and storage costs (Table 3). Assuming packing and handling charges (from $1.25 to $1.50) the total F.O.B. cost would be $2.35 or more per packed box.

Table 3. WINTER PEARS: Cost of Production, Hood River Valley, Oregon, 1947-1949. (Does not include cost of storage, boxes, packing, and shipping)

Item	Year 1947	Year 1948	Year 1949	3-year average	Percentage of average
Number of orchards in the study	24	24	21	---	---
Acreage of winter pears per orchard	10.7	11.8	10.9	---	---
Yield per acre, loose lug boxes	459	398	444	434	---
Yield per acre, packed boxes	406	363	388	386	---
Costs per loose lug box for:	Cents	Cents	Cents	Cents	Per cent
Preharvest labor	31.4	29.4	26.0	29.0	28.4
Picking	12.1	13.3	9.8	11.7	11.4
Other harvest	6.8	5.9	6.3	6.3	6.2
Total labor	50.3	48.6	42.1	47.0	46.0
Materials	14.8	18.6	15.5	16.3	15.9
General expense	14.5	17.7	17.0	16.4	16.0
Depreciation on equipment	7.8	9.0	8.3	8.3	8.1
Interest on investment (5 per cent)	13.8	15.8	13.2	14.3	14.0
Total cost per loose lug box	101.2	109.7	96.1	102.3	100.0
Cost per packed-box basis	114.3	120.3	109.9	114.8	---

A 10 per cent increase in yield for 1949 over 1948 was accompanied by a 9 per cent decrease in cost per lug box and per packed-box basis, respectively. See Table 5 for the labor requirements by operations and the itemized costs per acre for the winter pear orchards studied.

Bartlett (cannery) pears

The cost of producing cannery pears in 1949 on 20 orchards averaged $1.24 per lug box and $53.44 per ton (Table 4). See Table 6 for itemized costs.

Table 4. BARTLETT (CANNERY) PEARS: Cost of Production, Hood River Valley, Oregon, 1947-1949. (Includes all costs, delivered to the cannery door)

Item	Year 1947	Year 1948	Year 1949	3-year average	Percentage of average
Number of orchards in the study	23	24	20	---	---
Acreage bearing pears per orchard	4.7	5.2	5.9	---	---
Yield per acre, loose lug boxes	263	258	363	295	---
Yield per acre, tons	5.8	5.9	8.4	6.7	---
Costs per loose lug box for:	Dollars	Dollars	Dollars	Dollars	Per cent
Preharvest labor	.60	.51	.45	.52	34.5
Picking	.11	.12	.09	.11	7.3
Other harvest	.08	.08	.06	.07	4.6
Total labor	.79	.71	.60	.70	46.4
Materials	.26	.28	.18	.24	15.9
General expense	.26	.28	.20	.25	16.6
Depreciation on equipment	.12	.14	.10	.12	7.9
Interest on investment (5 per cent)	.21	.23	.16	.20	13.2
Total cost per loose lug box	1.64	1.64	1.24	1.51	100.0
Cost per ton	$74.60	$72.31	$53.44	$66.78	---

Table 5. WINTER PEAR PRODUCTION COSTS: Hood River Valley, 1947-1949.
(Does not include cost of storage, boxes, packing, and shipping)

Item	Man hours			Cost		
	1947	1948	1949	1947	1948	1949
Labor per acre						
Pruning	49.9	44.6	43.1	$ 46.00	$ 42.77	$ 43.11
Brush removal	4.9	4.6	4.1	4.60	4.43	3.89
Hand cultivating	2.5	2.3	1.6	2.18	1.99	1.34
Machine cultivating	3.6	2.7	3.2	3.40	2.82	3.29
Fertilizing; mowing	2.2	1.8	1.2	2.02	1.90	1.21
Irrigating	14.5	9.8	10.6	14.09	9.74	10.69
Spraying	14.1	12.7	8.7	12.99	12.99	9.48
Thinning	1.8	.1	—	1.58	.06	—
Propping	6.8	5.9	3.6	6.20	5.43	3.21
Maintenance	25.0	20.4	22.9	24.60	21.27	24.47
Supervision	20.1	8.6	12.3	26.61	13.66	14.80
Total preharvest	145.4	113.5	111.3	$144.27	$117.06	$115.49
Picking	64.8	66.0	54.7	55.36	52.94	43.78
Other harvest	31.4	22.7	27.0	31.33	23.40	27.90
Total labor	241.6	202.2	193.0	$230.96	$193.40	$187.17
Materials per acre						
Fertilizers				$ 14.39	$ 16.10	$ 11.67
Irrigation water				5.75	5.52	6.31
Sprays				37.44	40.75	37.10
Miscellaneous supplies				10.24	11.87	13.85
Total materials				$ 67.82	$ 74.24	$ 68.93
General expense per acre						
Building repair				$ 4.67	$ 2.50	$ 2.80
Machinery repair				11.13	8.75	9.53
Machine hire				1.86	3.15	6.26
Gas and oil				11.07	12.80	12.00
Electricity; water; wood fuel; office				6.82	8.69	9.16
Liability, fire, and motor insurance				7.60	7.87	8.00
Property taxes				13.30	16.54	17.59
Cash to operate				10.00	10.00	10.00
Total general expense				$ 66.45	$ 70.30	$ 75.34
Depreciation per acre						
Buildings (not including operator's dwelling)				$ 13.63	$ 12.81	$ 11.22
Machinery				22.02	23.26	25.54
Total depreciation				$ 35.65	$ 36.07	$ 36.76
Interest per acre (5 per cent)						
Buildings				$ 10.06	$ 9.81	$ 9.12
Machinery				11.13	11.90	11.29
Orchard				42.37	41.17	38.06
Total interest				$ 63.56	$ 62.88	$ 58.47
Total cost per acre				$464.44	$436.89	$426.67
Cost per loose box				$ 1.01	$ 1.10	$ .96
Cost per packed box				$ 1.14	$ 1.20	$ 1.10
Acres per orchard				10.7	11.8	10.9
Loose lug boxes produced per acre				459	398	444
Packed boxes produced per acre				406	363	388

Table 6. BARTLETT PEAR PRODUCTION COSTS: Hood River Valley, Oregon, 1947-1949.
(Includes all costs delivered to the cannery door)

Item	Man hours			Cost		
	1947	1948	1949	1947	1948	1949
Labor per acre						
Pruning	23.9	37.0	42.2	$ 22.00	$ 36.95	$ 42.55
Brush removal	4.2	4.8	3.4	4.12	4.54	3.22
Hand cultivating	4.9	4.0	3.7	4.33	3.71	3.22
Machine cultivating	3.4	3.3	4.2	3.50	3.45	4.24
Fertilizing; mowing	1.8	1.3	1.4	1.73	1.32	1.41
Irrigating	14.9	7.8	12.4	14.57	7.91	12.53
Spraying	16.2	14.0	9.1	14.85	14.38	9.78
Thinning	43.3	27.8	44.1	37.12	24.41	38.89
Propping	11.6	5.1	5.0	10.24	4.65	4.92
Maintenance	25.1	21.3	26.1	24.89	23.14	28.85
Supervision	15.8	5.9	9.9	19.72	8.23	12.31
Total preharvest	165.1	132.3	161.5	$157.07	$132.69	$161.92
Picking	34.1	38.7	41.2	29.18	31.03	33.00
Other harvest	21.2	20.0	21.5	20.37	20.05	22.79
Total labor	220.4	191.0	224.2	$206.62	$183.77	$217.71
Materials per acre						
Fertilizers				$ 12.07	$ 16.74	$ 11.49
Irrigation water				5.01	5.25	5.65
Sprays				42.19	41.55	36.31
Miscellaneous supplies				10.06	10.43	11.79
Total materials				$ 69.33	$ 73.97	$ 65.24
General expense per acre						
Building repair				$ 4.51	$ 2.79	$ 2.50
Machinery repair				10.23	9.82	7.25
Machine hire				2.88	2.80	8.41
Gas and oil				10.47	12.30	10.38
Electricity; water; wood fuel; office				7.73	9.15	9.11
Liability, fire, and motor insurance				10.19	7.94	8.24
Property taxes				12.63	16.59	17.58
Cash to operate				10.00	10.00	10.00
Total general expense				$ 68.64	$ 71.39	$ 73.47
Depreciation per acre						
Buildings (not including operator's dwelling)				$ 12.12	$ 12.23	$ 9.52
Machinery				20.80	22.79	24.46
Total depreciation				$ 32.92	$ 35.02	$ 33.98
Interest per acre (5 per cent)						
Buildings				$ 9.54	$ 9.72	$ 9.01
Machinery				10.97	12.02	12.37
Orchard				34.16	37.31	36.66
Total interest				$ 54.67	$ 59.05	$ 58.04
Total cost per acre				$432.18	$423.20	$448.44
Cost per loose-lug box				$ 1.64	$ 1.64	$ 1.24
Cost per ton				$ 74.60	$ 72.31	$ 53.44
Acres per orchard				4.7	5.2	5.9
Tons produced per acre				5.8	5.9	8.4
Loose boxes produced per acre				263	258	363

Age of the Trees

The orchards typically have trees of varying ages ranging from a year up to maturity (Table 7). The usual practice followed by most growers is to replace any dead or undesirable trees and thus tend to perpetuate the orchards. Therefore, depreciation on orchard investment was not included in computing the cost of producing fruit.

Table 7. AGE OF TREES: Distribution on 21 Farms Studied, Hood River Valley, Oregon, 1949.

Age of trees	Apples	Winter pears	Bartlett pears	
			Total	Bearing
	Per cent	Per cent	Per cent	Per cent
Less than 6 years	12	12	27	*
6 to 9 years	8	11	31	46
10 to 14 years	10	6	8	10
14 years and over	70	71	34	44
All trees	100	100	100	100

* This group of trees was not included in computing cost of production because the nonbearing trees comprised an abnormally high proportion of the total Bartlett pear plantings on the farms studied.

About four-fifths of the apple trees were 10 years old or over. Over three-fourths of the winter pear trees were 10 years or older. In the case of the Bartlett pears only 42 per cent of the trees had come into full bearing. One-third of the trees were just beginning to produce, while more than one-fourth were less than 6 years old when this study began. In order to make the three orchard enterprises studied more nearly comparable, the latter group of trees (less than six years old) was excluded in computing cost of production. Thus 46 per cent of the Bartlett pear trees covered in the cost study were less than full bearing age (under 10 years), and 54 per cent of the trees were in full bearing.

Varieties

Newtown and Delicious (Red, Striped, and Golden) comprised the major portion of the apple acreages on the farms studied (Table 8). D'Anjou is the principal winter (storage) pear, and the Bartlett is the canning pear.

Table 8. VARIETIES OF TREES: Distribution on 21 Farms Studied, Hood River Valley, Oregon, 1949.

Apples on farms studied		Winter pears on farms studied	
Variety	Percentage	Variety	Percentage
Newtown	53	D'Anjou	86
Delicious	34	Bosc	10
Ortley	5	Easter	2
Spitzenberg	4	Comice	1
Other	4	Other	1
Total	100	Total	100

Orchard Investment

The capital value represented by the plantings was estimated by the growers from a conservative, long-term standpoint. Consideration was given in the appraisal to the age and variety of trees and to the location and character of the land.

The present (depreciated) values of buildings (other than operator's dwelling) and all other equipment were allocated proportionately to the various enterprises according to the use made thereof (Table 9).

Table 9. ORCHARD INVESTMENT: Average Value of Capital Investment on 21 Farms Studied, Hood River Valley, Oregon, 1949*

Item	Apples		Winter pears		Bartlett pears	
	Value per orchard	Value per acre	Value per orchard	Value per acre	Value per orchard	Value per acre
Orchard	$ 9,907	$ 612	$ 8,262	$ 761	$ 4,347	$ 733
Buildings	2,865	177	1,976	182	1,067	180
Equipment	3,302	204	2,454	226	1,471	248
Cash for operating	3,238	200	2,171	200	1,186	200
Total investment	$19,312	$1,193	$14,863	$1,369	$ 8,071	$1,361

* See Table 10 for acreages per orchard studied.

Apple enterprise

The estimated worth of the capital, represented by the apple enterprise on the 21 farms in the study, averaged $19,312 per orchard. Nearly half of the total capital investment for apple production, or $612 per acre, was for the plantings.

Buildings (exclusive of the operator's dwelling) averaged $2,865 per apple orchard. The equipment inventory, averaging $3,302 per apple orchard, includes irrigation equipment as well as the machinery, tractors, trucks, and small tools. It does not include the automobile (charge for the use of automobiles was computed on a mileage basis).

Winter pears

The investment for winter pears averaged $14,863 per orchard. The value of the plantings averaged $8,262 per orchard or $761 per acre. The investment in buildings and equipment per acre of pears was similar in amount to that shown for apple orchards in this study.

Bartlett (canning pears)

The investment for bearing Bartlett pears averaged $8,071 per orchard. Plantings represented $4,347 each or $733 per acre.

Land Use

The size of the 21 farms in the study averaged 57 acres per farm (Table 10). Orchard plantings comprised 35.4 acres per farm. This was 84 per cent of the total cropland or 62 per cent of the total farm acreage. The remainder of the cropland was chiefly in hay or used as pasture. Much of the untillable acreage is steep, rocky, and covered with trees and brush.

Table 10. FRUIT FARMS: Utilization of the Land on 21 Farms Studied,* Hood River Valley, Oregon, 1949.

Land Use	Number of farms	Acreage per farm reporting	Average acreage per farm	Percentage of total farm area
		Acres	Acres	Per cent
Apples	20	16.2	15.4	27.0
Bartlett pears	21	7.6	7.6	13.4
Winter pears	21	10.9	10.9	19.1
Other	13	2.5	1.5	2.6
Total orchard	21	---	35.4	62.1
Other cropland	11	8.5	4.4	7.7
Farmstead	21	2.2	2.2	3.9
Nontillable	19	16.6	15.0	26.3
Total	21	---	57.0	100.0

* Of the 35.4 acres in orchard, apple trees occupied 15.4 acres per farm. Total pear (winter and canning) acreage slightly exceeded the apple orchards with 18.5 acres per farm. Thirteen of the 21 growers in the study had cherry plantings. These averaged 2.5 acres per farm reporting cherries.

Purpose and Nature of the Study

The purpose of this study was to obtain information from growers that would provide basic facts on yields and on costs of production. This information, when carefully adjusted to reflect changes occurring in yields and in the price level of farm production cost, provides a basis whereby cost of production can be readily estimated for any given year if no changes have occurred in production techniques.

The cost of production reported herein is the average-acre cost of the entire plantings in the study. Thus, the man-hours-per-acre (See Tables 2, 5, 6) 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 each operation. The same holds true of the other items of cost.

Acknowledgments

The authors gratefully acknowledge the fine cooperation received from the 21 growers who kept detailed daily records which provided the data for this report. Special mention is made of the financial assistance contributed by the Hood River Traffic Association. Without the active participation of both these groups, the study would have been impossible.

Leroy Childs, Superintendent of the Hood River Branch Experiment Station, Paul C. Newkom, Apple Growers Association, Robert Nunamaker, fruit grower, and A. L. Marble, formerly County Agricultural Agent of Hood River County, were instrumental in helping to plan and initiate this project.