

Cost of Producing **Sweet Cherries for Processing**

In the Willamette Valley and The Dalles Area

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Foreword

This bulletin reports the costs of producing sweet cherries (for processing) in the Willamette Valley and The Dalles area in 1946.

It also shows carefully computed estimates of what the costs would have been in 1946 if the yield per acre had been equal to the average yield obtained in the four-year period 1943-1946. Estimated costs are presented for each year from 1932 to 1945 in the Willamette Valley, based on the average annual yield per acre and the level of wages and other farm costs in each year.

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

Cost figures in terms of dollars may go out of date very rapidly.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

A handwritten signature in cursive script, reading "Wm. A. Schoenfeld". The signature is written in dark ink and is positioned above the printed name and title.

Director
Oregon Agricultural Experiment Station

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Summary

The Situation

Oregon ranked third in the United States in tonnage of sweet cherries, producing 24.3 per cent of the total crop reported over the nine-year period 1938-1946.

The acreage of all cherry orchards in the state in 1943 was estimated as 15,200 acres. Approximately 90 per cent of the acreage was in sweet cherries.

Canning and brining have been the principal outlets for Oregon's sweet cherries, each accounting for one-third of the total.

Imports, chiefly natural sulphured, or in brine, at times are a serious factor in the marketing of domestic production.

Cost Study Made of Cherry Production

Size of orchard

The 93 orchards in the cost study varied in size from 2 to 212 acres and averaged 19.3 acres per farm.

The estimated capital investment in the cherry enterprise averaged \$18,994 per farm or \$982 per acre of cherries, of which \$649 was for the orchard exclusive of equipment.

Cost of production

The cost of producing sweet cherries (for processing) in Oregon in 1946 averaged \$403 per acre or 8.33 cents per pound with an average yield of 4,839 pounds per acre.

Cost of all labor averaged \$268.19 per acre or 66.5 per cent of total cost. Harvest labor comprised four-fifths of the entire labor cost or 55 per cent of all costs. This item is designated as a *variable* cost because it tends to vary with yield per acre.

Fixed costs, or costs which do not vary with the yield per acre, include depreciation, interest, and property taxes. These items averaged \$75.27 per acre or 18.7 per cent of the total cost of production.

Semifixed costs, or maintenance and miscellaneous costs, which to some extent vary with the yield per acre, in 1946 averaged \$105.93 per acre or 26.3 per cent of total costs.

The cost on 66 orchards in the Willamette Valley averaged 7.95 cents per pound, compared to 9.01 cents on 27 orchards studied in The Dalles area.

The cost on 31 orchards (one-third of the total studied) with the lowest costs of production averaged 6.56 cents per pound in

1946, while the 31 orchards with the highest costs averaged 12.14 cents per pound in 1946.

Orchards producing less than 2,000 pounds per acre had an average cost of 15.8 cents per pound, while those producing more than 10,000 pounds had an average cost of only 6.6 cents.

The smallest orchards had high yields which offset their high preharvest labor and machinery costs.

The growers' estimates of orchard valuations were in direct proportion to productivity of the plantings.

Valley-land orchards in the Willamette Valley were considerably more productive as a group than were the hill-soil orchards.

The yields on irrigated orchards in The Dalles area were approximately double those on unirrigated tracts. The cost of irrigation averaged \$40 per acre in 1946.

Royal Anne comprised 65.3 per cent of the cherry acreage studied; Lambert 19.8 per cent; Bing, 8.1 per cent; and all other varieties 6.8 per cent. The average age of the orchards was about 25 years.

Of these plantings 70 were set on the square system and 27 on the diagonal plan. The spacing between the trees varied from 20 feet up to 50 feet or more.

Estimating current costs

It is impracticable to repeat a cost study every year, but if production methods are not materially changed, and if cost items are presented in physical as well as in money terms, cost data are useful beyond the period of the study. With the aid of index numbers relating to the major cost items, it is possible to make any necessary adjustments for a given year. In this way the estimated costs of producing cherries in Oregon were computed for the 14-year period 1932-1945.

Acknowledgements: This study was made possible by the support received from the Willamette Cherry Growers, Inc., The Dalles Cooperative Growers, Columbia Fruit Growers, Eugene Fruit Growers' Association, Hood River Branch Experiment Station and the Oregon Agricultural Experiment Station.

The authors express appreciation to all the cherry growers who cooperated in this study and to the officers of their respective organizations for help in conducting the field work; to County Agricultural Agents O. S. Fletcher, Lane County, O. E. Mike-sell, Linn County, Harry L. Riches, Marion County, W. C. Leth, Polk County, E. M. Nelson, Wasco County, and Louie H. Gross, Yamhill County for their assistance; and to many associates who gave liberally in time and help to produce this report.

Cost of Producing **Sweet Cherries for Processing** **In the Willamette Valley and The Dalles Area**

By GUSTAV W. KUHLMAN and D. CURTIS MUMFORD¹

Introduction

FRUIT growers and processors requested the Oregon Agricultural Experiment Station to obtain data on the costs of producing sweet cherries (for processing) in the major producing areas of Oregon.

Purpose of this study

The chief 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 costs, provides a basis whereby cost of production can be readily estimated for any given year if no changes have occurred in production techniques. Another purpose of the study was to determine the major factors affecting yields and costs among growers.

The Situation

Location of sweet cherry acreage in the United States

The commercial production of sweet cherries in the United States is located almost entirely in 10 states (Table 1). Six-western

Table 1. SWEET CHERRIES: AVERAGE PRODUCTION PER YEAR IN THE 10 MAJOR PRODUCING STATES, 1938-1946*

State	Number of tons	Percentage of tonnage
		<i>Per cent</i>
California	27,000	31.6
Washington	25,000	29.2
Oregon	20,744	24.3
Utah	3,233	3.8
Michigan	3,011	3.5
New York	2,089	2.4
Idaho	1,810	2.1
Pennsylvania	1,555	1.8
Ohio	635	.8
Colorado	400	.5
10 states	85,477	100.0

*Agricultural Statistics, 1946.

¹Associate Economist and Head of Department of Farm Management, respectively, Oregon Agricultural Experiment Station. William H. Coffield and Manning H. Becker, students in Farm Management at Oregon State College, were employed to assist in the field work and analysis of the data.

states account for over 90 per cent of the 85,477 tons average annual production over the nine-year period 1938-1946. The three Pacific Coast states alone produced 85 per cent of the crop during this period. Oregon ranked third in tonnage of sweet cherries, producing 24.3 per cent of the total reported for the United States.

Location of sweet cherry acreage in Oregon

In 1943 the area devoted to cherry trees reached a total equivalent to 15,200 acres, nearly twice the acreage in 1920 (Table 2).¹ Most of the expansion took place between 1920 and 1930.

Table 2. CHERRIES: DISTRIBUTION OF ACREAGE, BY LEADING COUNTIES, OREGON, 1943¹

County	Percentage of total acreage	Number of acres			
		Commercial		Non-commercial	Total
		Bearing	Non-bearing		
	<i>Per cent</i>				
Wasco	27.0	3,500	400	200	4,100
Marion	16.4	2,100	250	150	2,500
Polk	11.2	1,400	200	100	1,700
Lane	10.5	1,300	200	100	1,600
Yamhill	7.9	1,050	50	100	1,200
Hood River	6.2	700	135	100	935
Umatilla	3.9	530	55	15	600
Union	3.5	415	65	50	530
Linn	2.3	225	75	50	350
Clackamas	2.1	225	25	75	325
Washington	2.0	200	25	75	300
Total in 11 counties	93.0	11,645	1,480	1,015	14,140
Total other counties	7.0	655	70	335	1,060
STATE	100.0	12,300	1,550	1,350	15,200

¹Oregon Extension Bulletin 631: *Oregon's Tree Fruits and Nuts*.

Four leading varieties of sweet cherries in Oregon, the Royal Anne, Bing, Lambert, and Black Republican, cover 8,000 acres.

Approximately 89 per cent of the commercial acreage was of bearing age in 1943. Sweet cherries have comprised about 90 per cent of the total commercial cherry production in Oregon.

Utilization of sweet cherry production

The fresh sales outlet accounted for 45 per cent of the commercial crop in the United States in 1945 (Table 3). In Oregon, however, the principal outlets were canning and brining, each accounting for one-third of the total. There were 6,060 tons frozen in the United States in 1945, compared to only 1,580 tons in 1944 and 676 tons in 1943, the first year that commercially frozen cherries were reported.

¹Oregon Extension Bulletin 631, *Oregon Tree Fruits and Nuts*.

Table 3. SWEET CHERRIES: UTILIZATION OF COMMERCIAL TONNAGE IN THE UNITED STATES AND IN OREGON, 1945*

Item	United States		Oregon	
	Number of tons	Percentage of total	Number of tons	Percentage of total
		<i>Per cent</i>		<i>Per cent</i>
Fresh sales	42,670	45.0	4,900	27.4
Brined	23,810	25.1	5,800	32.4
Canned	21,580	22.8	5,900	33.0
Frozen	6,060	6.4	900	5.0
Other	700	.7	400	2.2
Total	94,820	100.0	17,900	100.0

* Agricultural Statistics, 1946.

Exports and imports

Domestic exports of canned and fresh cherries have averaged 4,000 tons per year during the five-year period 1935-1939. Imports, chiefly natural sulphured or brined cherries, were 11,000 tons in 1929, and then dropped, because of the increased U. S. tariff of 1930, to an average of 755 tons per year during the five-year period 1935-1939.

Imports become a serious factor to growers when tariff agreements are made admitting foreign cherries into the U. S. market.

Description of the Study

Areas studied

Sweet cherries (for processing) are produced chiefly in Wasco County, and in Lane, Marion, Polk, and Yamhill counties of the Willamette Valley.

In Wasco County the greater part of the orchard area is near the city of The Dalles, situated on the south bank of the Columbia River about 90 miles east of Portland (cover picture).

The main orchards are on old stream terraces adjacent to the present stream channels.¹ The elevations of orchard tracts vary from 130 feet above sea level up to 1,250 feet, but the majority of the orchards are at elevations ranging from 350 to 750 feet.

The Dalles region is semiarid and is characterized by warm, dry summers and rather cold, wet winters. The period 1931 to 1942, inclusive, had an average precipitation of only 12.7 inches, according to data from The Dalles station. Many orchards are on exposed sites and show evidence of winter damage such as misshapen trees (Figure 1). The use of sprinkler irrigation from wells has increased as rapidly in recent years as the cherry growers

could obtain the necessary facilities.

The soils are low in organic matter, but have a fairly high waterholding capacity. All of them are easily eroded and those on the steeper slopes are highly erodible.

Cherry orchards in the Willamette Valley are predominantly on hill soils, and are often found in conjunction with other tree-fruit plantings.² Orchards located on valley-floor soils and occasionally on bottom lands, are usually part of a well-diversified system of general farming.

Rainfall is usually adequate in this area to produce a satisfactory yield of cherries without resorting to irrigation on any tracts adapted to orchard enterprises. Rains and frosts, however, are serious hazards of sweet cherry production in Western Oregon. Frequently one or both impair the normal setting of fruit on the trees and occasionally destroy the entire crop.

Method and extent of the study

A comprehensive study of cherry-production costs and practices for the 1946 crop year was conducted by the survey method in cooperation with representative growers scattered throughout the important cherry-producing (for processing) counties of Oregon (Table 4). The orchards studied varied in size from 2 acres to 212 acres, averaging slightly over 19 acres per farm for the entire group.

A field survey schedule showing the orchard investment, the man labor required, equipment used, and all other costs incurred in orchard operations for the 1946 cherry crop was obtained by trained enumerators from those cherry growers selected for the study.



Figure 1. These trees show the effects of their environment—wind and slope.

¹O. F. Bartholomew. 1944. *Soil Survey of The Dalles Orchard Area, Oregon*. Oregon Agricultural Experiment Station Bulletin 424.

²See Soil Survey report for each county (Lane, Marion, Polk, and Yamhill) for a full description of these areas.

Table 4. SWEET CHERRIES (FOR PROCESSING): NUMBER, ACREAGE, PRODUCTION AND AVERAGE YIELD OF BEARING ORCHARDS STUDIED, BY COUNTIES AND AREAS, OREGON, 1946

Area	Farms	Acres studied	1946 production ¹	Yield per acre	
				1946	1943-1946 ²
		<i>Acres</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Lane County	18	187	1,300,511	6,955	3,021
Marion County	15	370.5	1,686,304	4,551	2,335
Polk County	21	474	2,031,301	4,285	2,331
Yamhill County	12	161	598,913	3,720	2,573
TOTAL WILLAMETTE VALLEY	66	1,192.5	5,617,029	4,710	2,491
Wasco County	27	605.5	3,083,520	5,093	4,555
TOTAL STATE	93	1,798	8,700,549	4,839	3,194

¹Exclusive of 184,901 pounds cullage, averaging 103 pounds per acre.²Four-year average, representing a total of 6,250 acres of cherry production.

Records were compiled for 93 representative growers (66 growers in the Willamette Valley and 27 in The Dalles area) operating approximately one-fifth of the Oregon acreage of sweet cherries devoted to production for processing.

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 Table 9) is a figure that is applicable to the entire acreage of a crop within an area such as a county. It 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.

Description of Farms

In Oregon, generally, the cherry enterprise is part of a diversified farming system. Some of the larger cherry farms studied, however, were quite specialized. The same was true of some small operators, particularly in The Dalles area.

Land use

The average size of the farms on which production-cost records were taken was 165 acres, of which 113 acres were tilled land (Table 5). Orchards comprised 45.7 acres per farm on the 93 farms studied, and about half of this acreage was cherry orchard. Other orchard acreages were chiefly prunes, walnuts, filberts, and apricots. Land use varied widely among the cooperators, from strictly cherry production to widely diversified systems of farming.

Table 5. CHERRY FARMS: UTILIZATION OF THE LAND ON 93 FARMS STUDIED; OREGON, 1946

Land use	Number of farms	Acreage per farm reporting	Average acreage per farm	Percentage of total farm area
		<i>Acres</i>	<i>Acres</i>	<i>Per cent</i>
Sweet cherries, bearing age	93	19.3	19.3	11.7
Other cherries	35	10.6	4.0	2.4
Other orchards	70	29.7	22.4	13.5
Other fruits	11	9.3	1.1	.7
Vegetable crops	14	15.3	2.3	1.4
Field crops	50	116.8	62.8	38.0
Fallow	3	49.7	1.6	.8
TOTAL TILLABLE	93		113.5	68.5
Nontillable and farmstead	84	57.6	52.0	31.5
TOTAL LAND	93		165.5	100.0

Capital investment

The total capital investment in land and buildings, based on estimates made by each grower interviewed, averaged \$46,435 per farm or \$280 per acre (Table 6). Land comprised 82 per cent of the

Table 6. CHERRY FARMS: SIZE AND DISTRIBUTION OF CAPITAL INVESTMENT IN REAL ESTATE PER FARM AND PER ACRE; OREGON, 1946

Item	Value of capital investment		Percentage of total capital
	Total per farm	Average per acre	
			<i>Per cent</i>
Sweet cherries in bearing	\$12,550	\$649	27.1
Other orchard acreage	12,227	464	26.3
Small fruit and vegetable acreage	1,210	355	2.6
Other cropland	9,870	153	21.3
Nontillable land	2,183	42	4.7
All land	\$38,040	\$230	82.0
Buildings and irrigation equipment	\$ 8,395	\$ 50	18.0
TOTAL FARM	\$46,435	\$280	100.0

total value of the real estate, with buildings and irrigation equipment comprising 18 per cent. It will be noted that these figures apply to the whole farm regardless of how the property was used.

The bearing cherry enterprise itself, on each of the 93 orchards studied, represented an average investment of \$18,994 per orchard or \$982 per acre (Table 7). Of this amount, the orchard itself was valued at \$649 per acre. The share of the total investment in buildings, machinery, and operating cash chargeable to the cherry enterprise totalled \$6,444 or an average of \$333 per acre. After each grower had carefully estimated the value of his orchard he was

Table 7. CHERRY ENTERPRISE INVESTMENT: AVERAGE VALUE OF CAPITAL INVESTED IN 93 ORCHARDS STUDIED; WILLAMETTE VALLEY AND THE DALLES AREA, OREGON, 1946

Item	Value per orchard	Value per acre	Percentage of total
			<i>Per cent</i>
Orchard	\$12,550	\$649	66.1
Buildings	1,428	74	7.5
Irrigation equipment	681	35	3.6
Machinery	752	39	4.0
Sprayer and duster	297	15	1.6
Tractor	351	18	1.8
Automobile and truck	615	32	3.2
Cash for operating	2,320	120	12.2
TOTAL	\$18,994	\$982	100.0

asked to evaluate similar land without the trees. The values that were thus placed on the land averaged \$181 per acre (Table 8). The highest average value for an area was \$326 per acre placed on the land by the growers in Lane County, where the location and competitive uses for the land combined to determine the high valuation.

Table 8. CHERRY PLANTINGS: VALUATION PER ACRE OF BEARING ORCHARDS STUDIED, AND VALUES IMPUTED TO LAND AND TREES; BY AREAS, OREGON, 1946

Area	Estimated value per acre		
	Land	Trees	Total orchard
Lane County	\$326	\$472	\$798
Marion County	137	431	568
Polk County	138	415	553
Yamhill County	168	312	480
Willamette Valley	\$171	\$415	\$586
The Dalles Area	\$200	\$573	\$773
ALL ORCHARDS	\$181	\$468	\$649

The Cost of Cherry Production

The cost of producing sweet cherries (for processing) in 1946, with the yield averaging 4,839 pounds per acre, was \$8.33 per hundred pounds (Table 9).¹

Cost defined

The total cost as herein presented includes both the cash expenditures and estimates of noncash items. Costs include: (1) wages covering work done by the operator and members of his family, hired labor, and contract work; (2) outlay for materials and repairs;

¹The cost of production includes all items of expense incurred in producing and delivering the crop to the door of the processing plant.

(3) general expense for repairs, motor fuels, taxes and other miscellaneous items; (4) depreciation of any equipment chargeable to the enterprise; and (5) interest at 5 per cent on the capital investment.

Table 9. SWEET CHERRIES (FOR PROCESSING): ITEMIZED COSTS PER AVERAGE ACRE AND PER HUNDRED-WEIGHT BASIS, WILLAMETTE VALLEY AND THE DALLES AREA, OREGON, 1946

(For 1,798 acres in 93 orchards producing 8,700,549 pounds, an average yield of 4,839 pounds per acre.)

Item	Cost per acre	Cost per 100 pounds*	Percentage of cost
<i>Labor</i>			<i>Per cent</i>
Pruning (7.2 hours per average acre)	\$ 6.80	\$.14	1.7
Brush disposal (2.0 hours per average acre)	1.87	.04	.5
Cultivating (4.1 hours per average acre)	3.95	.08	1.0
Fertilizing (1.6 hours per average acre)	1.50	.03	.4
Irrigating (3.3 hours per average acre)	3.18	.07	.8
Spraying and dusting (4.1 hours per average acre)	4.06	.08	1.0
Grafting and hoeing (3.0 hours per average acre) ..	2.93	.06	.7
Picking (247.3 hours per average acre)	180.79	3.74	44.8
Hauling (5.7 hours per average acre)	5.66	.12	1.4
Other harvest (28.5 hours per average acre)	28.40	.59	7.0
Supervision and miscellaneous (29.2 hours per average acre)	29.05	.60	7.2
TOTAL LABOR (336.0 hours per average acre)	\$268.19	\$5.55	66.5
<i>Materials</i>			
Sprays and dusts	\$ 14.69	\$.30	3.6
Fertilizers and cover crop seed	6.62	.14	1.7
Irrigation water and pumping	1.98	.04	.5
TOTAL MATERIALS	\$ 23.29	\$.48	5.8
<i>General Expense</i>			
Machinery repair	\$ 10.72	\$.22	2.6
Building repair	2.03	.04	.5
Motor fuel and oil	6.68	.14	1.7
Motor license and insurance	1.76	.04	.5
Pay roll insurance	6.95	.14	1.7
Property taxes	2.79	.06	.7
Supplies, bees, trees	4.52	.09	1.1
Telephone and office	2.40	.05	.6
Electricity, fire insurance, water	1.19	.02	.2
TOTAL GENERAL EXPENSE	\$ 39.04	\$.80	9.6
<i>Depreciation</i>			
Machinery	\$ 17.26	\$.36	4.3
Buildings	3.95	.08	1.0
Irrigation equipment	2.15	.04	.5
TOTAL DEPRECIATION	\$ 23.36	\$.48	5.8
<i>Interest</i>			
Machinery	\$ 5.21	\$.11	1.3
Buildings	3.69	.08	1.0
Irrigation equipment	1.76	.04	.5
Cash for operating	6.00	.12	1.4
Orchard	32.46	.67	8.1
TOTAL INTEREST (at 5 per cent)	\$ 49.12	\$1.02	12.3
TOTAL COST	\$403.00	\$8.33	100.0

* In order to avoid third-place decimals, the cost items have been reported on the 100-pound basis instead of the pound basis. To find cost per pound, therefore, the dollar values may be read as cents.

The cost statement (Table 9) is itemized in such a manner that costs exclusive of depreciation and interest may be observed as well as the entire cost. Thus the study shows that the cost of producing cherries exclusive of the depreciation and interest charge on capital was \$330.52 per acre or an average of \$6.83 per 100 pounds in 1946.

Cost data a useful guide for studying any orchard

The average production requirements in terms of labor and materials and their costs should be of particular interest and value to those cherry growers who do not keep detailed records themselves. Any grower, by referring to Table 9, may readily draw up a list of the operations performed in his orchard during any season, together with an estimated wage for each type of work listed. The total cost of this labor may then be brought to Table 13, where space is provided for recording all of the items in the cost of producing cherries. Thus the grower has a convenient method of briefly analyzing his own enterprise in relation to the average results found in this study. This method of comparison is also useful in planning the budget for the year ahead.

Major Items of Cost in Producing Cherries

Labor costs

The average cost of all the man labor used in producing cherries in Oregon in 1946 was \$268.19 per acre or two-thirds of the total cost of production (Table 9). The average labor requirement per acre was 336 hours, of which 247 hours (about three-fourths of the total) was for picking the fruit. All other hired labor averaged 36 hours per acre, family labor 5 hours per acre, and the operator's labor 48 hours per acre. The latter item included 29 hours per acre for supervision and the share of all miscellaneous farm work of the operator during the year which was chargeable to the cherry enterprise.

All operations, including contract work, and picking, were recorded on the hour basis. The number of hours picking by mixed crews (largely composed of women and children) was computed on the basis of 20 pounds of fruit per hour of picking. This is equivalent to 73 cents per hour for picking. The wages for all other hired labor averaged 97 cents per hour, and the estimated rate for the operator and family labor averaged \$1.00 per hour. The wage rates include the cash cost of lodging, board, and other perquisites furnished to regular hired help in addition to or in place of a cash consideration.

The wage rates, however, do not include the value of family housing furnished, that item being reflected in depreciation, interest, and repair of buildings. Wage rates for the operator and the unpaid family labor were based on the prevailing wage paid to hired help performing the same type of work.

Materials

The cost of materials was \$23.29 per acre or 5.8 per cent of the total cost. Two-thirds of this outlay was made for spray and dusting materials, chiefly to control the cherry fruit fly.

General expense

General expenses, including repairs, motor fuels, insurance, and taxes, aggregated \$39.04 per acre or 9.6 per cent of all costs.

Depreciation

The cost for depreciation of the equipment (buildings, tools, and irrigation equipment) chargeable to the cherry enterprise was \$23.36 per acre or 5.8 per cent of the total cost of production. Machinery, including power equipment, motor vehicles, and harvesting equipment comprised three-fourths of this total depreciation. Ladders, boxes, and picker buckets were important items of cost on some farms.

The orchards typically have trees of varying ages ranging from a year up to more than 50 years. The practice of replacement followed by most growers tends to perpetuate the orchards. Therefore depreciation on orchard investment was not included in computing the cost of producing fruit.

Interest

Interest, charged at 5 per cent on the estimated capital value of the orchard, equipment, and cash needed for operating, was \$49.12 per acre or 12.3 per cent of the total cost of producing cherries in 1946. Interest on the average valuation of the orchard (\$649 an acre) was \$32.46 per acre or two-thirds of the total interest charge.

It will be noted that the interest on the estimated amount of cash required to operate is \$6 per acre for the year. The bulk of this cash is required at harvest time in June. The cooperatives then pay their growers by installments extending well into the following season, for the cherries delivered.

Low investment per acre for machinery and buildings was generally achieved through utilizing some of the equipment for other farm enterprises, by operating fairly large orchards, by renting out equipment, or by hiring custom work done.

Itemized costs on farm equipment

Costs on 50 trucks used on the farms studied averaged 11.5 cents per mile for 3,950 miles driven in 1946. Costs on 42 pickups averaged 9.4 cents per mile for 3,750 miles. Costs on 70 tractors averaged 83 cents per hour for 680 hours used during the year. The cost per duster averaged \$124, and the cost per sprayer \$155 in 1946.

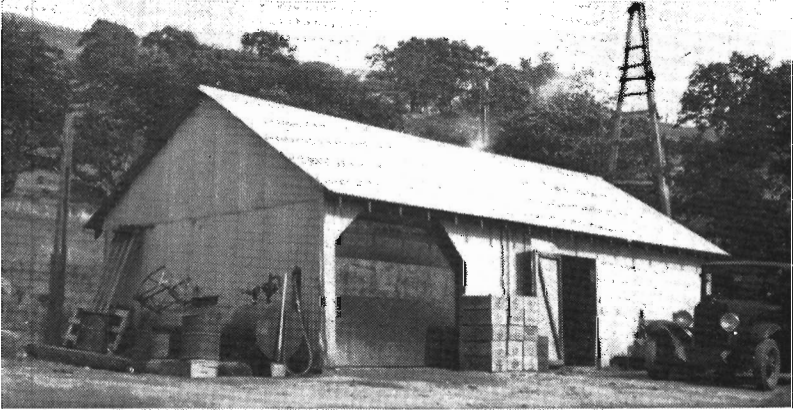


Figure 2. Above: A well-equipped shop and machine shed is a big factor in operating the farm efficiently. Fuel oil tanks at left of shed are fitted with pumps that enable operator to service motors inside the shed.

Below: Housing and camp facilities vary on farms from those having almost nothing to offer seasonal help to those having attractive camp sites and modern cabins. This Wasco County scene shows a tent with only straw bedding and an earth floor. Cooking is done outdoors.



Table 10. SWEET CHERRIES (FOR PROCESSING): THE COST OF USING FARM EQUIPMENT, COMPUTED ON THE BASIS OF EACH \$1,000 PRESENT VALUATION, OREGON, 1946
(Data include costs on 92 trucks and pickup trucks, 70 tractors, 43 dusters, 35 sprayers, and all the general equipment.)

	Machinery						Irrigation equipment	Farm buildings
	Truck	Tractor	Duster	Sprayer	Other	Total		
<i>State</i>								
Years remaining life	6.0	6.5	6.7	7.4	5.6	6.0	16.4	18.9
Depreciation	\$168	\$153	\$149	\$135	\$179	\$166	\$ 61	\$ 53
Interest	50	50	50	50	50	50	50	50
Repairs	147	139	89	80	57	103	7	24
Fuel and oil	107	169	18	11	.....	64	.....	.....
License, insurance	55	.....	.....	.....	.....	17	.....	.....
Total	\$527	\$511	\$306	\$276	\$286	\$400	\$118	\$127
<i>Willamette Valley</i>								
Years remaining life	5.4	6.2	7.2	7.2	5.4	5.8	.....	18.9
Depreciation	\$184	\$162	\$139	\$140	\$184	\$173	.....	\$ 53
Interest	50	50	50	50	50	50	.....	50
Repairs	147	132	98	83	43	96	.....	22
Fuel and oil	118	151	24	9	.....	65	.....	.....
License, insurance	61	.....	.....	.....	.....	15	.....	.....
Total	\$550	\$495	\$311	\$282	\$277	\$399	.....	\$125
<i>The Dalles Area</i>								
Years remaining life	6.8	7.5	6.1	7.9	5.9	6.5	16.4	18.9
Depreciation	\$147	\$133	\$165	\$126	\$171	\$154	\$ 61	\$ 53
Interest	50	50	50	50	50	50	50	50
Repairs	147	153	77	75	82	113	7	29
Fuel and oil	91	208	8	15	.....	63	.....	.....
License, insurance	61	.....	.....	.....	.....	21	.....	.....
Total	\$496	\$544	\$300	\$266	\$303	\$401	\$118	\$132

The complete detailed costs of all the equipment used in connection with cherry production have been expressed as a ratio of the respective inventory values (Table 10). Thus the year's cost on all farm machinery used equalled \$400 per \$1,000 worth (inventory value) of all machinery or 40 per cent of the present (depreciated) valuation. The ratio for trucks and tractors was approximately \$500 per \$1,000 of equipment or 50 per cent of the present (depreciated) valuation. Costs on dusters, sprayers and miscellaneous equipment averaged around \$300 per \$1,000 or 30 per cent, and cost on buildings \$127 per \$1,000 or 12.7 per cent of the present (depreciated) values. While these results represent averages of conditions found on all the farms studied, they serve as a basis for estimating costs or rates to consider under any particular circumstance.

Fixed and Variable Costs

Some items of cost are quite fixed regardless of the production obtained, while others vary more or less with the size of the crop produced (Table 11). Any groupings of costs are, of course, somewhat arbitrary and therefore should be regarded only as rough approximations.

Table 11. SWEET CHERRIES (FOR PROCESSING): FIXED AND VARIABLE COSTS, OREGON, 1946
(Average yield, 4,839 pounds per acre.)

Item	Cost per acre	Cost per 100 pounds	Percentage of total cost
<i>Fixed costs</i>			<i>Per cent</i>
Depreciation, interest, taxes	\$ 75.27	\$1.56	18.7
<i>Semifixed costs</i>			
Maintenance and miscellaneous	105.93	2.19	26.3
<i>Variable costs</i>			
Harvest labor	221.80	4.58	55.0
TOTAL COST	\$403.00	\$8.33	100.0

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, designated as fixed costs, amounted to \$75 per acre or \$1.56 per hundred pounds of cherries produced in 1946.

Semifixed costs

Semifixed costs, including preharvest labor, fertilizers and spray materials, farm motor fuels, repairs on equipment and buildings, costs of tree replacements, and other miscellaneous items, amounted to \$106 per acre or \$2.19 per hundredweight of cherries harvested in 1946. 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 advisable for the sake of future production.

Variable costs

Variable costs include labor and other costs incurred only for harvesting the crop. A considerable proportion of these costs, amounting to \$222 per acre or 55 per cent of all costs in 1946, would generally be eliminated during a year of crop failure. How serious, then, are the fixed and semifixed costs in case of crop failure or impaired yields? It will be noted that in 1946 the combined fixed and semifixed costs were about \$180 per acre or 3.75 cents per pound with a yield of 4,839 pounds per acre. If, however, a grower obtained only 3,600 pounds his fixed and semifixed costs would increase to 5 cents per pound, while if the yield were only 1,800 pounds these

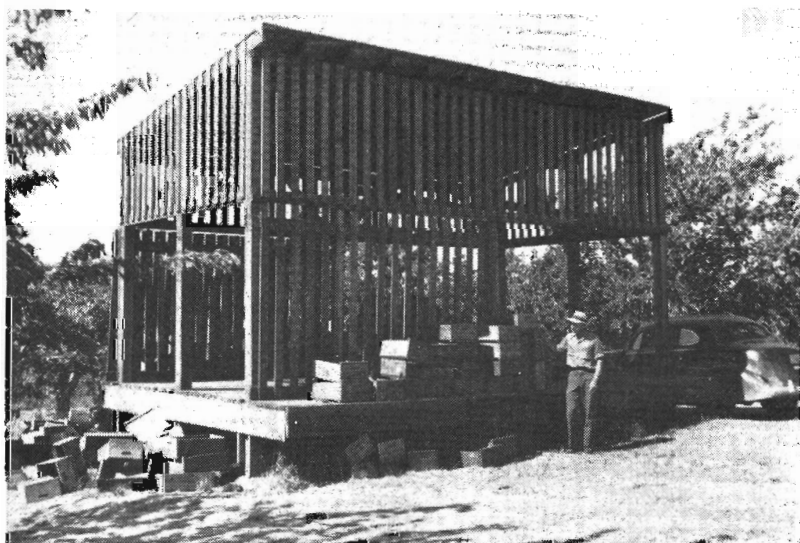


Figure 3. This loading platform, measuring 16 by 24 feet, was built in 1944 at a cost of \$400. A platform enables one man with a warehouse truck to handle six or more boxes at a time.

costs would increase to 10 cents per pound exclusive of harvesting expense.

Extreme losses were encountered by many growers in 1947 when rains severely damaged the cherries at harvest time throughout the state. For example, a cooperative in the Willamette Valley received only 160 pounds per acre of cherry orchard under contract. This was approximately 10 per cent of the estimated tonnage on the trees. Since growers had followed their usual practices up to harvesting, the cost of production would average more than a dollar per pound for the small tonnage salvaged.

Major Items of Cost

The cost of labor per acre, as reported in this study, was obtained by multiplying the average number of hours reported for each operation on the total acreage studied by the wage rate paid or estimated by the growers for the specific work done. Thus the data, as previously mentioned, 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.

Except for harvest costs (which far exceeded all other costs in 1946) the largest items of expense, grouped on the basis of field

Table 12. SWEET CHERRIES (FOR PROCESSING): COST OF LABOR, MATERIALS, AND OTHER EXPENSE ITEMS PER ACRE; BY FIELD OPERATIONS, OREGON, 1946
(Yields averaged 4,839 pounds per acre.)

Item	Labor	Materials	Other expense	Total cost
Pruning	\$ 6.80	\$	\$	\$ 6.80
Brush disposal	1.87	.....	.85	2.72
Grafting and tree replacement .....	.92	.....	.81	1.73
Fertilizing	1.50	6.62	1.03	9.15
Cultivating	3.95	.....	6.06	10.01
Hoing	2.01	.....	.....	2.01
Irrigating	3.18*	1.98	4.24	9.40
Spraying and dusting	4.06	14.69	6.06	24.81
Picking	180.79	.....	7.47	188.26
Other harvesting	34.06	.....	.96	35.02
Supervision and miscellaneous	29.05	.....	8.47	37.52
Pay roll insurance .....	.....	.....	6.95	6.95
Automobile and truck .....	.....	.....	16.74	16.74
Building expense .....	.....	.....	10.63	10.63
Property taxes .....	.....	.....	2.79	2.79
Interest on cash for operating .....	.....	.....	6.00	6.00
Interest on orchard investment at 5 per cent ¹ .....	.....	.....	32.46	32.46
TOTAL COST PER ACRE	\$268.19	\$23.29	\$111.52	\$403.00
Percentage of the cost	66.5%	5.8%	27.7%	100.0%

¹Interest on capital invested in buildings and machinery is included under various items.

operations, were for supervision and miscellaneous expense, interest on the orchard investment, and spraying and dusting operations (Table 12).

The cost per acre of several different operations averaged around \$10 per acre; namely, pruning and brush disposal together, the total fertilizing program, and the cultivating. While the same figure holds regarding the cost of irrigating, it does not denote a standard inasmuch as irrigating was done on less than one-fourth of the total acreage studied. However, the item for building expense, and the automobile and truck expense (if divided equally) each approximate the \$10 per acre figure.

Costs in the Willamette Valley compared with The Dalles area

The Willamette Valley cherries are produced generally without irrigation, whereas in The Dalles area the use of irrigation has been increasing rapidly. Some of the cost items are practically identical in the two areas (Table 13). For example, cultivating, cover crop

Table 13. SWEET CHERRIES (FOR PROCESSING): COST STUDY OF 93 ORCHARDS CONTAINING 1,798 ACRES IN THE WILLAMETTE VALLEY AND THE DALLES AREA, OREGON, 1946

Item	Total study, 93 orchards	Willamette Valley, 66 orchards	Estimate for your orchard*	The Dalles area, 27 orchards
Acres per orchard	19	18	.....	22
Pounds of cherries per acre	4,839	4,710	.....	5,093
Estimated value of orchard per acre	\$649	\$586	\$.....	\$773
<i>Cost per acre</i>				
Pruning	\$ 6.80	\$ 4.78	\$.....	\$ 10.77
Brush disposal	2.72	2.13	.....	3.89
Grafting and tree replacement	1.73	1.53	.....	2.03
Cultivating	10.01	10.00	.....	10.03
Hoeing	2.01	.90	.....	4.19
Cover cropping	3.83	3.71	.....	4.05
Fertilizing	4.28	2.72	.....	7.35
Manuring	1.04	.84	.....	1.43
Irrigating	9.40	.....	.....	27.91
Spraying	6.52	7.56	.....	4.46
Dusting	18.29	20.72	.....	13.52
Picking	188.26	183.69	.....	197.25
Other harvest expense	35.02	37.36	.....	30.42
Supervision and miscellaneous labor	29.05	24.07	.....	38.84
Automobile and truck	16.74	15.21	.....	19.77
Buildings, lights, fire insurance	10.63	9.63	.....	12.59
Pay roll insurance	6.95	5.97	.....	8.89
Property taxes	2.79	2.69	.....	2.98
Rental on bees	1.41	.20	.....	3.81
Other miscellaneous expense	13.06	11.55	.....	16.02
Interest on orchard investment at 5 per cent..	32.46	29.32	.....	38.65
TOTAL COST PER ACRE	\$403.00	\$374.63	\$.....	\$458.85
Cost per pound	8.33¢	7.95¢	.....¢	9.01¢

* See Table 9.

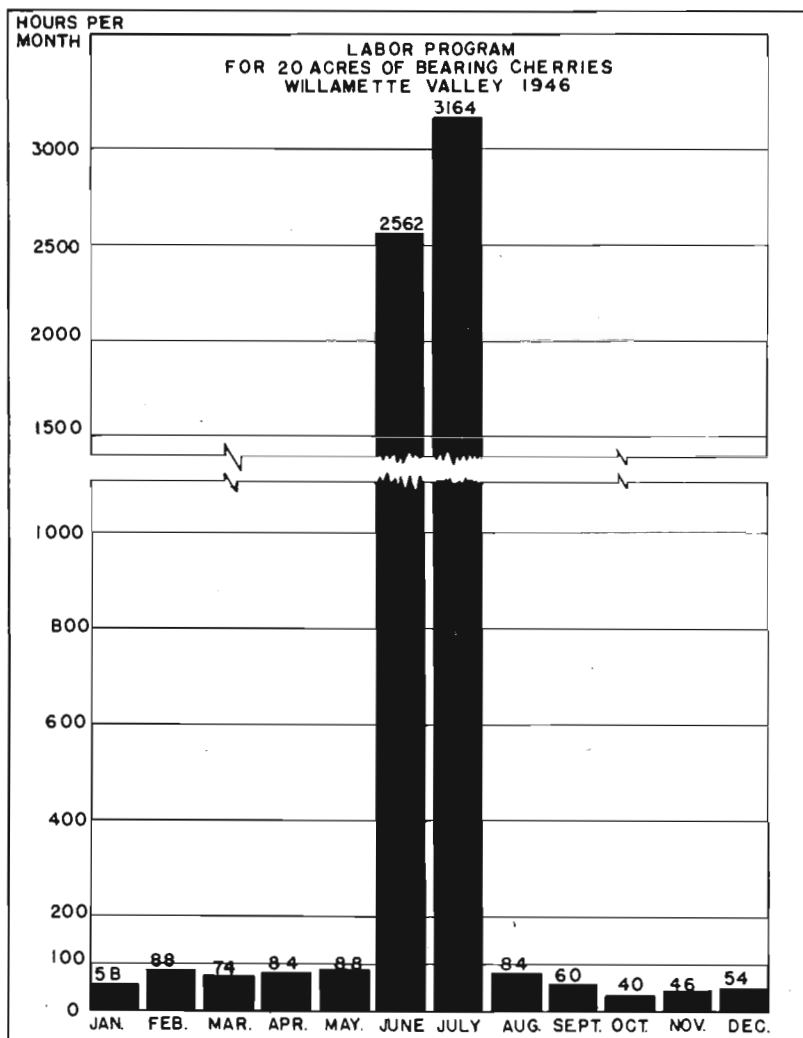


Figure 4. The man labor required in the production of sweet cherries (for processing) in 1946 was recorded by type of work and its distribution by months. On the basis of the average labor required annually per acre of bearing orchard, the estimated total labor requirement for a 20-acre orchard in the Willamette Valley would be 6,402 hours. Assuming 25 8-hour days (200 hours) per month as a full-time job, a 20-acre cherry enterprise provides full-time work for the operator only a small part of the year (see Table 14).

expense, other harvest expense, taxes, and miscellaneous are similar in amount. Far more pruning is done in The Dalles area. This is partly because of the growth stimulated by irrigation and partly because of the dead wood resulting from drought and other causes where irrigation is not practiced. Growers in this area also use commercial fertilizers more generally than do growers in the Willamette Valley. An exceptionally prolonged harvest period in 1946 accounts for the comparatively high cost for dusting (for fruit fly) by the Willamette Valley growers.

Seasonal Distribution of Man Labor

Most of the cooperators in this study felt that the labor requirements for cherry production did not seriously interfere with either those for the grain and hay crops commonly grown on diversified farms in the Willamette Valley or those for other fruits in either area studied (Figure 4 and Figure 5). On the other hand, as a specialized farm, a cherry orchard usually falls far short of furnishing full-time employment to the operator and his family. Aside from harvesting operations the monthly labor requirement on a 20-acre cherry orchard, for example, would be relatively small in terms of an operator's total employable time.

During the 10 months exclusive of harvesting season (June and July) the total man labor performed monthly on the orchards studied in the Willamette Valley was equivalent to only 3.4 hours per acre or an average of 68 hours per month on a 20-acre orchard (Table 14). That is only one-third of one man's time, assuming 25 eight-hour days (200 hours) per month as a full-time job. On that basis a 20-acre cherry orchard provides full-time work for the operator during only a few months of the year, even where jobs such as pruning are concentrated over a short period.

The weather, of course, plays an important role in determining if and when some of the jobs are done in a cherry orchard. One operator with an irrigated orchard said he usually spent about four months (April-July) on his orchard and then left the county until the following April (Table 15).

Individual farmers, of course, vary their procedure in order to fit the needs of their particular conditions. For example, part of the pruning has sometimes been done as early as December instead of in the late winter months when the weather may be less disagreeable. Some pruning is done also after harvesting, particularly to clean up broken and dead branches in preparation for a summer cultivation to loosen the soil packed during harvesting.

The bulk of the work at harvesting time must be done by hired help. Speed is necessary then in order to avoid losses from rains and other causes which threaten the crop.

The total amounts of man labor required for operations (such as cultivation and spraying per average acre) were also computed

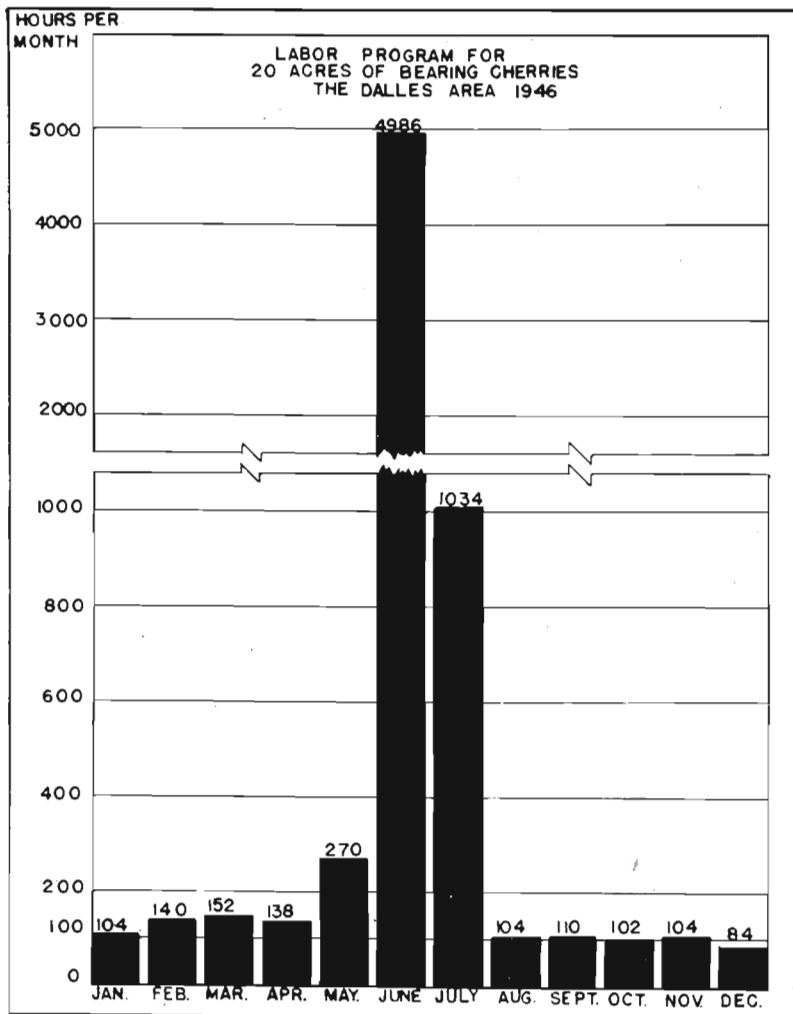


Figure 5. The average labor required annually per acre of bearing orchard in The Dalles area was nearly 15 per cent larger than in the Willamette Valley, chiefly because of the irrigation work done in The Dalles area (see Table 15).

Table 14. SWEET CHERRIES (FOR PROCESSING): APPROXIMATE DISTRIBUTION OF MAN LABOR FOR 1,193 ACRES OF ORCHARD; BY OPERATIONS AND MONTHS, WILLAMETTE VALLEY, OREGON, 1946

Operation	Total man hours per average acre	Monthly distribution of man hours per average acre											
		January	February	March	April	May	June	July	August	September	October	November	December
Pruning and brush disposal	7.7	.9	2.3	1.2	.1	....	.1	1.0	1.1	.1	....	.3	.6
Disking	3.2	....	....	....	1.1	1.2	.2	....	.5	.2	....	....	....
Other machine cultivation	1.0	....	....	....	....	.4	.4	....	.1	.1	....	....	....
Miscellaneous hand work	1.0	....	....	....	....	.3	.7	....	....	....	....	....	....
Sowing cover crop .....	.5	....	....	....	....	....	....	....	.1	.4	....	....	....
Fertilizing .....	.7	....	.1	.1	.1	....	....	....	.2	.2	....	....	....
Spraying	2.5	....	.4	.6	.3	....	.9	.1	.2	....	....	....	....
Dusting	1.8	....	....	....	.3	.2	.9	.4	....	....	....	....	....
Preparing for harvest	2.2	....	....	....	....	....	2.2	....	....	....	....	....	....
Picking	240.7	....	....	....	....	....	105.9	134.8	....	....	....	....	....
Other harvest labor	27.5	....	....	....	....	....	12.1	15.4	....	....	....	....	....
Hauling fruit	6.2	....	....	....	....	....	2.7	3.5	....	....	....	....	....
Cleanup	1.0	....	....	....	....	....	....	1.0	....	....	....	....	....
TOTAL DIRECT LABOR ..	296.0	.9	2.4	1.7	2.2	2.4	126.1	156.2	2.2	1.0	....	.3	.6
INDIRECT LABOR*	24.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
TOTAL LABOR PER ACRE	320.1	2.9	4.4	3.7	4.2	4.4	128.1	158.2	4.2	3.0	2.0	2.3	2.7
TOTAL LABOR PER ORCHARD (20 acres)†..	6,402	58	88	74	84	88	2,562	3,164	84	60	40	46	54

* Indirect labor of the operator is the share of his total general farm upkeep and maintenance work which was charged to cherries. This labor is arbitrarily distributed by months over the whole year.

† The average size of the 93 orchards in this study was 19½ acres (see Figure 4).

Table 15. SWEET CHERRIES (FOR PROCESSING): APPROXIMATE DISTRIBUTION OF MAN LABOR FOR 605 ACRES OF ORCHARD; BY OPERATIONS AND MONTHS, THE DALLES AREA, OREGON, 1946

Operation	Total man hours per average acre	Monthly distribution of man hours per average acre											
		January	February	March	April	May	June	July	August	September	October	November	December
Pruning and brush disposal	14.6	1.9	3.5	3.9	1.5	1.2	.....	.9	.....	.3	.....	.1	1.3
Disking	2.1	.....	.....	.....	1.1	.6	.3	.....	.....	.1	.....	.....	.....
Other machine cultivation	1.8	.....	.....	.....	.2	.7	.2	.2	.2	.1	.1	.1	.....
Miscellaneous hand work	4.2	.....	.....	.2	.4	2.1	1.5	.....	.....	.....	.....	.....	.....
Sowing cover crop .....	.7	.....	.....	.....	.....	.....	.....	.....	.....	.5	.2	.....	.....
Fertilizing	1.6	.....	.....	.1	.1	.....	.....	.....	.....	.9	.4	.1	.....
Irrigating	9.6	.....	.....	.....	.3	4.9	.....	.5	1.0	.3	1.0	1.6	.....
Spraying	1.2	.....	.2	.1	.....	.6	.1	.....	.1	.....	.1	.....	.....
Dusting	2.2	.....	.....	.....	.....	.1	1.2	.3	.6	.....	.....	.....	.....
Preparing for harvest	2.8	.....	.....	.....	.....	.....	2.8	.....	.....	.....	.....	.....	.....
Picking	260.5	.....	.....	.....	.....	.....	219.1	41.4	.....	.....	.....	.....	.....
Other harvest labor	20.1	.....	.....	.....	.....	.....	16.9	3.2	.....	.....	.....	.....	.....
Hauling fruit	4.6	.....	.....	.....	.....	.....	3.9	.7	.....	.....	.....	.....	.....
Cleanup	1.2	.....	.....	.....	.....	.....	.....	1.2	.....	.....	.....	.....	.....
TOTAL DIRECT LABOR.....	327.2	1.9	3.7	4.3	3.6	10.2	246.0	48.4	1.9	2.2	1.8	1.9	1.3
INDIRECT LABOR*	39.2	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	2.9
TOTAL LABOR PER ACRE	366.4	5.2	7.0	7.6	6.9	13.5	249.3	51.7	5.2	5.5	5.1	5.2	4.2
TOTAL LABOR PER ORCHARD (20 acres)†.....	7,328	104	140	152	138	270	4,986	1,034	104	110	102	104	84

* Indirect labor of the operator is the share of his total general farm upkeep and maintenance work which was charged to cherries. This labor is arbitrarily distributed by months over the whole year.

† The average size of the 93 orchards in this study was 19½ acres (see Figure 5).

on the basis of the labor actually required per acre each time over the orchard (Table 16 and Table 17).

Variations in Costs

The cost of cherry production in 1946 was nearly twice as high on the group of 31 orchards (one-third of the total studied) with the highest costs as it was on another group of 31 orchards with the lowest costs (Table 18).

Table 16. SWEET CHERRIES (FOR PROCESSING): AVERAGE NUMBER OF TIMES OVER AND THE MAN LABOR REQUIREMENTS OF DIFFERENT OPERATIONS USED IN PRODUCTION, WILLAMETTE VALLEY, OREGON, 1946

Operation	Times over orchard for acreage covered	Man hours required per acre once over	Total man hours required per acre	Percentage of total acres covered
				<i>Per cent</i>
Pruning and brush disposal ¹	1.0	7.7	7.7	100
Disking	5.1	.6	3.2	100
Other machine cultivation	1.9	.5	1.0	100
Miscellaneous hand work ²	1.0	1.0	1.0	100
Sowing cover crop ³	1.0	.6	.6	89
Fertilizing	1.0	1.5	1.5	43
Spraying ⁴	4.0	1.7	6.8	37
Dusting	5.2	.4	2.1	91
Preparing for harvest	1.0	2.2	2.2	100
Picking	1.0	240.7	240.7	100
Other harvest labor	1.0	27.5	27.5	100
Hauling fruit	1.0	6.2	6.2	100
Cleanup after harvest	1.0	1.0	1.0	100

¹Includes grafting and replanting.

²Includes hoeing around young trees, poisoning gophers, and other miscellaneous operations.

³Sometimes done by a two-man crew, especially where fertilizer attachment was used.

⁴Practically all sprayed orchards also were dusted one or more times.

Table 17. SWEET CHERRIES (FOR PROCESSING): AVERAGE NUMBER OF TIMES OVER AND THE MAN LABOR REQUIREMENTS OF DIFFERENT OPERATIONS USED IN PRODUCTION, THE DALLES AREA, OREGON, 1946

Operation	Times over orchard for acreage covered	Man hours required per acre once over	Total man hours required per acre	Percentage of total acres covered
Pruning and brush disposal ¹	1.0	14.6	14.6	100
Disking	2.8	.75	2.1	100
Other machine cultivation	4.1	.4	1.8	100
Miscellaneous hand work ²	1.0	4.2	4.2	100
Sowing cover crop ³	1.0	.8	.8	89
Fertilizing	1.4	1.3	1.8	91
Irrigating	1.8	7.6	13.7	70
Spraying ⁴	1.2	1.4	1.7	72
Dusting	3.0	.7	2.2	98
Preparing for harvest	1.0	2.8	2.8	100
Picking	1.0	260.5	260.5	100
Other harvest labor	1.0	20.1	20.1	100
Hauling fruit	1.0	4.6	4.6	100
Cleanup after harvest	1.0	1.2	1.2	100

¹Includes grafting and replanting.

²Includes hoeing around young trees, poisoning gophers, and other miscellaneous operations.

³Sometimes done by a two-man crew, especially where fertilizer attachment was used.

⁴Practically all sprayed orchards also were dusted one or more times.

Table 18. SWEET CHERRIES (FOR PROCESSING): VARIATIONS IN COST PER ACRE AND PER HUNDREDWEIGHT ON THE ONE-THIRD LOW-COST AND THE ONE-THIRD HIGH-COST ORCHARDS, OREGON, 1946

Item	31 low cost orchards	31 high-cost orchards
Acres per orchard	21.5	21.2
Pounds of cherries per acre in 1946	6,234	2,898
Pounds of cherries per acre, 4-year average, 1943-1946	3,569	2,345
<i>Cost per acre</i>		
Pruning and brush disposal	\$ 5.98	\$ 13.98
Cover crop and fertilizing	8.54	8.46
Cultivating and hoeing	9.34	13.75
Irrigating and pumping	5.06	11.13
Spraying and dusting	19.47	26.74
Picking	231.52	123.34
Other harvesting	33.38	32.19
Supervision and miscellaneous labor	20.26	35.41
Automobile and truck	11.89	18.30
Building expense	7.34	11.63
Payroll insurance	7.91	5.30
Property taxes	2.45	2.79
Other miscellaneous expense	13.02	18.71
Interest on orchard investment at 5 per cent	32.89	30.15
TOTAL COST PER ACRE	\$409.05	\$351.88
PREHARVEST COST PER ACRE	\$144.15	\$196.35
Cost per 100 pounds	\$ 6.56	\$ 12.14

While the items of cost varied somewhat on the acre basis, the variations usually were much greater on the pound basis. The average size of orchards in the two groups was quite similar. There was, however, a wide difference in the average yield per acre not only in 1946 but also over the four-year period, 1943-1946.

The data indicate that the high-cost operators had higher costs per acre for such items as pruning, cultivating, irrigating, spraying and general overhead, yet they obtained much lower yields. The difference in equipment cost per acre is especially significant in years when receipts are low.

What are the major factors responsible for these variations in cost of production from farm to farm, and how can the individual grower improve his own situation? Analysis of conditions associated with low-cost production on the farms cooperating in this study is presented in the following sections.

Some Major Factors Influencing Costs

The measurable factors found in this study to affect—or to be associated with—costs include yield per acre, size of orchard, quality or value of orchard, type of soils, and use of irrigation.

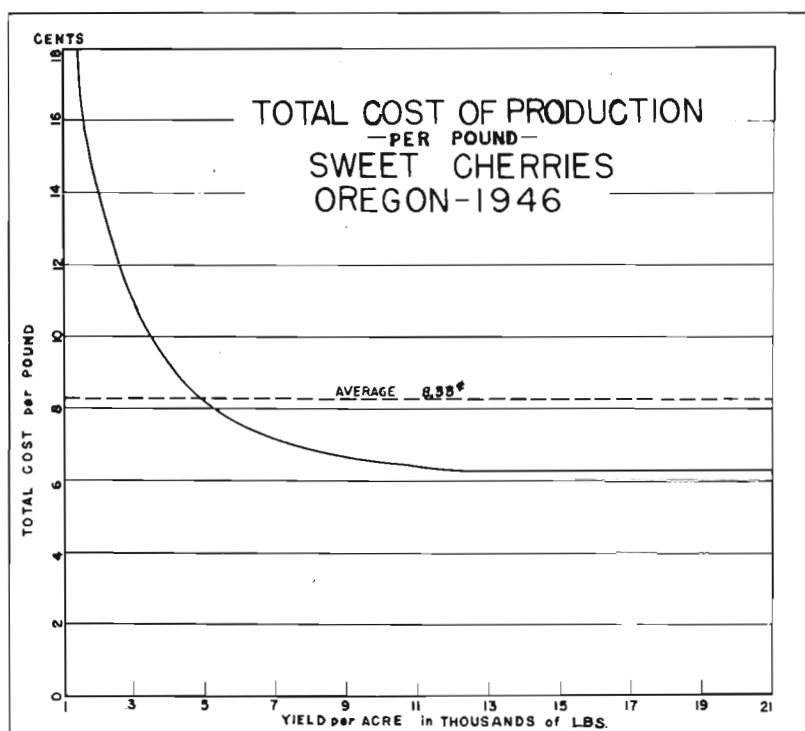


Figure 6. There is a definite tendency for costs per pound of cherries harvested to decrease as the yield per acre increases, at least up to 13,000 pounds.

Yield is usually a dominant factor in cost

The yield of cherries per acre varied widely from farm to farm in 1946 (Table 19). It is interesting to note also that these orchards showed about the same amount of variation in yields for the four-year period 1943-1946 as they did for the 1946 crop-year. The high-yield growers had much higher fixed costs per acre than the low-yield growers had, yet their fixed costs on the per-pound basis were considerably lower (Figure 6).

If the yield is small, each pound of cherries must bear a proportionately larger share of the overhead or fixed costs than if the yield is large (Figure 7).

Size of orchard affects overhead cost per acre

Usually the smaller the enterprise the higher are the equipment and labor costs per acre. This tended to be generally true of the

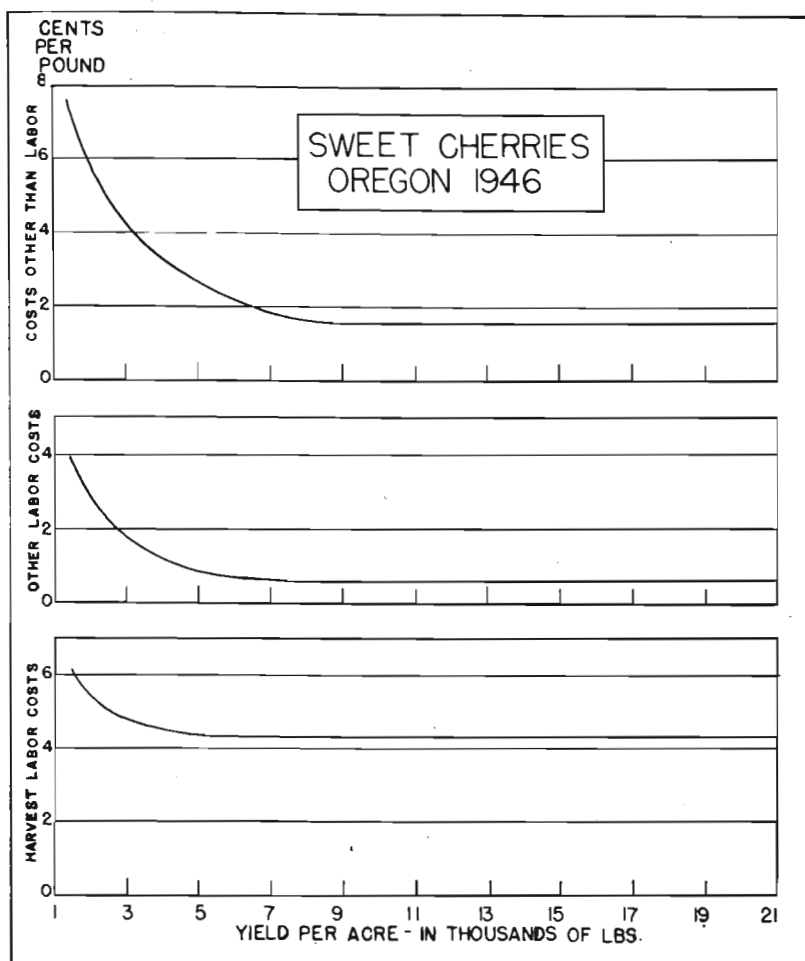


Figure 7. Each group of costs per pound was affected by the size of the crop harvested, but the greatest effect was on the costs other than labor.

cherry enterprise in 1946 (Table 21). Extremely small operators either have a high investment per acre in equipment or they are dependent upon custom work, with accompanying high costs, for such services. Fortunately for the small enterprise, it often produces a high yield which offsets in part the high cost of operation. The small operator also may be able to weather unfavorable years by doing all the work with his own and family labor.

Table 19. SWEET CHERRIES (FOR PROCESSING): RELATION OF YIELD TO COST IN 1946; WITH COMPARABLE YIELD DATA ON THE SAME ORCHARDS FOR THE FOUR-YEAR PERIOD 1943-1946, OREGON

Yield per acre 1946 crop Group	Average	Average yields 1943-1946	Number of orchards	Value of orchard per acre	Total cost per pound	costs (excluding harvest)	
						Per pound	Per acre
	<i>Pounds</i>	<i>Pounds</i>			<i>Cents</i>	<i>Cents</i>	
Less than 2,000 pounds	1,598	1,703	8	\$379	15.8	10.1	\$161
2,000 to 4,000 pounds	3,204	2,050	23	531	9.3	4.7	152
4,000 to 6,000 pounds	5,045	3,527	19	745	8.0	3.6	184
6,000 to 8,000 pounds	6,632	4,605	20	837	8.3	4.0	264
8,000 to 10,000 pounds	8,990	5,722	15	893	6.9	2.6	231
10,000 pounds or more	12,297	6,090	8	745	6.6	2.3	287
All orchards	4,839	3,194	93	\$649	8.3	3.9	\$188

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Table 20. SWEET CHERRIES (FOR PROCESSING): DISTRIBUTION OF TREE VARIETIES; BY THE AVERAGE AGE OF THE ORCHARDS STUDIED, OREGON, 1946 (Average age of trees was 25 years.)

Approximate age (years)	Period planted	Royal Anne	Other white	Lambert	Bing	Black Republican	Total acres
		<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Number</i>
Under 15	1930-1940	76.3	2.3	11.5	4.6	5.3	131
15-20	1925-1930	73.5	1.2	8.8	10.4	6.1	260
20-25	1920-1925	46.8	1.8	45.2	4.3	1.9	513
25-30	1915-1920	77.5	4.4	6.2	7.5	4.4	227
30-35	1910-1915	78.8	6.1	10.8	1.8	2.5	278
35 and over	Before 1910	69.6	1.2	16.2	9.2	3.8	240
Age not specified .....	.....	54.4	....	2.0	31.5	12.1	149
All orchards .....	.....	65.3	2.5	19.8	8.1	4.3	1,798

Table 21. SWEET CHERRIES (FOR PROCESSING): RELATIONS BETWEEN SIZE OF ORCHARDS, LABOR AND MACHINERY COST, YIELD, AND TOTAL COST PER POUND, OREGON, 1946

Acres in orchard		Number of orchards	Preharvest labor and machinery cost per acre	Yield per acre	Total cost per pound
Group	Average				
Less than 5	3	15	\$184	<i>Pounds</i> 9,572	<i>Cents</i> 7.9
5 to 9.9	7	19	115	4,804	9.4
10 to 14.9	11	20	136	6,569	8.1
15 to 29.9	21	23	110	5,234	8.1
30 or more	57	16	80	3,962	8.5
All orchards	19	93	\$101	4,839	8.3

Table 22. SWEET CHERRIES (FOR PROCESSING): VARIATION IN VALUE OF ORCHARD PER ACRE, SHOWING RELATION OF INVESTMENT TO YIELD AND COST, OREGON, 1946

Value of orchard per acre		Number of orchards	Cost per 100 pounds	Production per acre	
Group	Average			1946	1943-46
Less than \$500	\$ 353	17	\$8.33	<i>Pounds</i> 3,321	1,977
\$500 to \$699	557	24	8.94	4,336	2,840
\$700 to \$899	773	24	8.66	5,239	3,565
\$900 and over	1,026	28	7.72	7,019	4,744
Average	\$ 649	93	\$8.33	4,839	3,194

Orchard value reflected in yields

The study indicates that the growers properly based the valuation of their orchards largely on productivity—the quantity of cherries produced (Table 22). The variations in yield between the groups of orchards were practically as consistent each of the four years as they were in 1946. While the cost per hundredweight in 1946 did not vary greatly, it is worthy of note that the orchards having the highest valuation had the lowest cost per pound.

Hill soils compared with valley soils

The average yield of cherries on valley-floor land was 40 per cent higher in 1946 than the yield on hill-land orchards (Table 23). Practically the same difference in yields held true for the four-year period 1943-1946 on these orchards. The valuations placed on the respective groupings varied in about the same ratio as the yields. The value placed on the hill orchards by the owners averaged \$526 per acre, compared to \$680 per acre on the valley orchards—30 per cent more than on the hill land.

The hill orchards were considerably larger, averaging 25 acres compared to an average of 10 acres for the valley plantings. Those

Table 23. SWEET CHERRIES (FOR PROCESSING): COMPARISON OF HILL AND VALLEY LAND ORCHARDS, WILLAMETTE VALLEY, 1946

Item	Hill orchards	Valley-land orchards
Number of orchards	30	18
Acres per orchard	25	10
Approximate age of trees	25	28
Valuation of orchard per acre	\$ 526	\$ 680
Cost of producing per 100 pounds (1946)	\$8.23	\$7.58
Pounds produced per acre, 1946 crop	4,135	5,953
Pounds produced per acre, 1945 crop	1,164	1,762
Pounds produced per acre, 1944 crop	2,120	2,269
Pounds produced per acre, 1943 crop	1,706	2,710
Four-year average yield 1943-1946	2,281	3,174

hill orchards predominantly on Melbourne soils were valued 30 per cent higher than the hill orchards on Olympic and Aiken soils. The average four-year yield (1943-1946) was 20 per cent higher on the former or Melbourne soil group. The plantings on Melbourne soils were youngest, averaging 21 years, compared to 27 years for all other hill soils.

The valley-land group of orchards embraced 12 tracts with predominantly Willamette soils and 6 tracts with Amity soils. These were small orchards and somewhat older than the average of the entire study. As would be expected, the plantings on the Willamette soils, which generally are better drained than the Amity soils, were valued correspondingly higher: \$718 per acre for Willamette and \$584 per acre for Amity. Oddly, however, the yields in this case were higher on lower-quality soil each year over the four-year period 1943-1946. The average yield per year for the period was 3,797 pounds per acre on the Amity soils, compared to 2,915 pounds on the Willamette series, or 30 per cent higher production on the Amity soils. Doubtless there are explanations for the apparent paradox. Final conclusions should not be based on these limited observations. It is quite possible that many small plantings were located on the better portions of large areas, and thus benefited from a situation that is really better than it appears at first glance. At any rate, the study shows that the small tracts have been receiving more input per acre and returning the largest yields per acre.

Irrigation as a factor in The Dalles area

Irrigated orchards in Wasco County produced cherries in 1946 for 8.7 cents per pound compared to a cost of 12 cents on the

orchards that were not irrigated (Table 24). Yield, of course, was greatly increased by irrigation. The value of the orchards, in turn, was determined by the productivity.

Table 24. SWEET CHERRIES (FOR PROCESSING): EFFECT OF IRRIGATION ON YIELDS, ORCHARD VALUE, AND COST OF PRODUCTION, THE DALLES AREA, OREGON, 1946

Item	Orchard	
	Irrigated	Unirrigated
Number of records	21	6
Pounds of cherries produced per acre, 1946	5,828	2,375
Annual yield, 1943-1946	5,012	2,713
Value of orchard	\$844	\$509
Cost per pound, 1946	8.7¢*	12.0¢*

* The estimated costs of producing the four-year (1943-1946) average yields of 5,012 pounds per acre on the irrigated orchards and 2,713 pounds per acre on the unirrigated orchards, based on the respective costs for 1946 adjusted for the differences in yields, were 10 cents per pound on the irrigated tracts and 11 cents per pound on the unirrigated tracts. It should be noted that many of the irrigation facilities used in 1946 were only one to four years old, and therefore had only begun to affect the yield of cherries.

The cost of irrigating in 1946 averaged \$40 per acre irrigated (Table 25). This small share of the total cost was only $\frac{3}{8}$ cent per pound of cherries harvested.

Table 25. SWEET CHERRIES (FOR PROCESSING): COST OF IRRIGATING PER ACRE ON 422 ACRES RECEIVING WATER, THE DALLES AREA, 1946

Item	Cost per acre	
		Per cent
Use of equipment*	\$18.05	45.1
Man labor, 14 hours	13.54	33.9
Water and electricity	8.41	21.0
Total	\$40.00	100.0

* Inventory (depreciated) value of irrigation equipment in 1946 averaged \$146 per acre.

Irrigation in this area promotes a heavy growth of cover crops, with the aid of liberal applications of commercial fertilizers (Figure 8). Tree vigor is maintained better where irrigation water is available in suitable amounts.

Irrigation may well be considered a vital factor in the future if not in the present operation of cherry production in this semiarid region. Some of the orchards favorably situated may continue to produce profitably without supplemental irrigation water but many orchards will suffer progressively more as the trees increase in size and in their competition for the limited supply of ground water (Figure 9).

The 21 orchardists used varying amounts of water, ranging from a limited sprinkling from city mains, permitted only early in the spring, to three or more sizeable applications used to best advantage through the season. Four of the cooperators were limited to the city water supply; 3 others who used the city water also had well irrigation; 11 depended on wells; and 3 utilized water from creeks and springs. Two growers purchased water from their neighbors.

All of these growers used sprinklers excepting one who used the furrow method. Some of the installations represent a high initial investment per acre for the well, pump and motor, main pipe lines, laterals, and sprinklers. Some growers have gone to the expense of drilling a well and still have no water.

Practices and Observations

Age and variety of trees

Many of the plantings included in this study were of various ages and represented several varieties. The average age of the trees was about 25 years. The plantings ranged from 6 years up to more than 50 years. Recent plantings were on very small acreages which were included because they were part of a larger orchard. Sizable yields are obtained by the time plantings are 9 or 10 years old.

The Royal Anne variety comprised about two-thirds of the acreage studied (see Table 20). In all the age-groups, except the "20 to 25 year" group, the proportion was much higher. This exception included one extremely large planting of Lamberts. Otherwise there appeared to be no great change in the relative preference shown for varieties over the long period of years which these plantings represented. In response to the question "What variety do you prefer now?" the predominant answer was Royal Anne. Bing had a few votes. Black Republican, of course, is desirable as a pollinizer, in addition to having some commercial value.

In response to the question "What kind of rootstocks do your trees have?" the majority of growers answered "mazzard" (the wild sweet cherry, *Prunus avium*, used and recommended as rootstocks for improved varieties). Perhaps some growers knew this for a fact. More commonly they had depended upon the integrity of the nurseryman. Some probably were unaware of the significance inherent in the quality of rootstocks. A few admitted that when their trees came into bearing they proved to be a different variety from what they had expected.

Planting systems

The effect on yield of spacing the trees at different distances was impossible to determine satisfactorily in this study. The influence of other major factors, such as the age and variety of trees, and the type of soil, could not be sufficiently excluded to give reliable results. Practices followed, however, are here given as matters of interest in connection with the discussion of cost of production (Figure 10).

The square planting system predominated among the cherry orchards studied (Table 26). More than two-thirds of the tracts listed were planted in this manner. Only a few tracts were planted on the rectangular system. Spacing of trees 30 feet apart was most frequent.

Table 26. SWEET CHERRIES (FOR PROCESSING): PLANTING ARRANGEMENT AND SPACING OF TREES, SHOWING THE DISTRIBUTION OF ORCHARD BLOCKS ON THE FARMS STUDIED, OREGON, 1946

Square plan			Diagonal plan		
Dimensions	Number	Percentage	Dimensions	Number	Percentage
20 feet	6	8.6	20 feet	1	3.7
24 feet	5	7.1	24 feet	3	11.1
25 feet	11	15.7	25 feet	2	7.4
28 feet	6	8.6	27 feet	1	3.7
30 feet	16	22.9	30 feet	11	40.8
33 feet	8	11.4	32 feet	1	3.7
35 feet	7	10.0	35 feet	3	11.1
40 feet	7	10.0	40 feet	2	7.4
50 feet	3	4.3	Other	3	11.1
56 feet	1	1.4			
Total	70	100.0	Total	27	100.0

Intercropping

Most growers preferred not to intercrop a young orchard. A few suggested a truck crop such as melons for a year or two, or a planting of strawberries for two to four years. One grower felt that intercropping would attract gophers which cause damage to young trees and hamper irrigation. Where interplantings are retained after the cherry trees have come into bearing, it usually is necessary to treat them, as well as the cherry trees, with pest controls such as spraying or dusting.

Soil maintenance

Nearly all growers in 1946 had some cover crop in their orchard. Many applied commercial fertilizer to stimulate cover crop growth in the spring before the time to turn it into the soil. A few growers applied either manure or straw and, in one case, alfalfa clippings.



Figure 8. The cover crop of Rex winter wheat on this orchard (The Dalles area) was drilled early the preceding fall, insuring the maximum production of green manure. Adequate power and suitable equipment are necessary to disk the cover crop in the spring. This D-2 Caterpillar tractor is pulling an 8.5-foot offset disk.

Growers were forced, of course, to accept a wide variety of fertilizers because of the scarcity of most standard products.

The use of the cover crop in The Dalles area depends somewhat on having enough soil water available to decay the green manure crop and mature the cherries. Factors that reduce soil water include steep topography, winds, and high temperatures. The heavier soils low in organic matter resist water penetration, while the lighter soils have a low water-holding capacity.

Vetch seed mixed with some grain was most commonly used for cover crops in the Willamette Valley. Growers in The Dalles area used wheat, rye, or Austrian winter field peas. The time of sowing varied from August to November, depending on moisture conditions or convenience. About as many growers sowed broadcast as used a drill. Growers believed that good cover crops increase the top growth on their trees and top growth produces the heavy yields.

Pruning

Pruning generally was very light or moderate on cherry orchards. Some growers realized that their trees had been allowed to grow too tall before they were pruned to develop a desirable shape.

Occasionally the tops were cut back considerably. Sometimes this was done at harvest time to facilitate picking. Serious injury to the tree from breakage may occur even before the fruit is ripe if the crop is exceptionally large. Pruning includes the cost of removing dead trees, and, in some instances, perhaps the time spent in grafting.

Cultivation

Cherry orchards are probably cultivated less frequently than orchards that mature their crops later in the season. The number of times-over with tillage equipment ranged from 1 to 8 or more, the most common practice being 4 or 5 times-over. After the cover crop has been disked down in the spring, the preference is for shallow cultivation.

Spraying and dusting

Growers were shifting from the use of sprayers to dusters as soon as dusters became available. Dusting is, of course, much more rapidly done, but usually it must be done at night when there is less wind and the foliage is moist.

Some sprays and dusts were applied to control red spider, syneta beetle, caterpillar, shot-hole borer, or brown rot, but most spraying and dusting in cherry orchards was for controlling the cherry fruit fly.

Harvesting

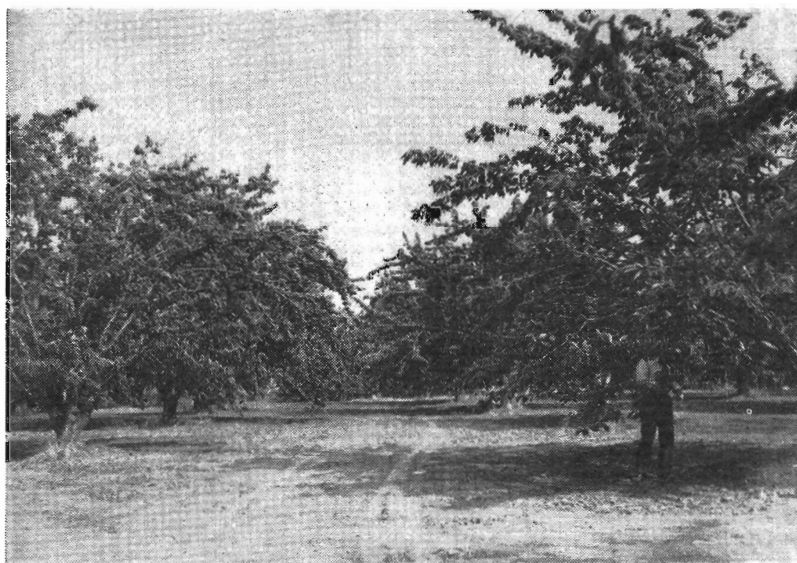
Procuring the necessary labor is rarely considered a serious problem in cherry production. In many cases the same people have returned year after year to harvest this crop. One grower who employs several hundred pickers each season explained that his wife has about three sets of inquiries to answer each season just before harvest, namely, (1) "Will there be a crop?" (2) "What are you going to pay?" and (3) "When should we start?"

Generally the growers prefer migrant workers for harvesting because they easily acquire the essential experience for handling fruit. Some growers, on the other hand, manage very well with local help (women and children). But such help must be properly instructed and carefully supervised. Interest in providing suitable camp facilities, however, is increasing, particularly on farms having



Figure 9. Views taken of two adjoining cherry tracts that were originally in one orchard planting in Wasco County. Above: This tract has had no irrigation. Many of the trees have deteriorated and some have been taken out entirely.

Below: This tract has had irrigation. These trees continue to be productive.



several kinds of fruit to harvest. Such farms offer a long season of employment, an inducement for good workers to remain on the same farm.

Hazards

Cherry growers were not inclined to dwell heavily on the subject of hazards in cherry production. They recognize the cherry fruit fly as a pest or a threat, but readily controllable. They suppose that oftentimes either rain or frost, or both, in the spring reduce the number or set of cherries on their trees. They frequently encounter rainy weather near harvest time which ruins much or all of the crop, as it did in 1947.

Estimated Costs and Returns Prior to 1946

What would the cost have been in 1946 if the yields had averaged only 3,194 pounds per acre—the four-year, 1943-1946, average yield on the orchards studied?

To observe the effect of more nearly normal yields on the cost of production, the various cost items obtained for the very large 1946 crop were recalculated on the bases of yields obtained on these orchards from 1943 to 1946 (Table 27).

By combining the 1946 average fixed costs per acre with the 1946 rate for harvesting the 3,194 pounds of cherries per acre, a total cost of \$10.20 per hundredweight is derived. The same procedure applied to the three-year, 1943-1945, average yield of 2,611 pounds per acre shows a total cost of \$11.42 per hundredweight, while the 1946 cost thus computed for the still smaller 1945 crop of 2,320 pounds per acre rises to \$12.25 per hundredweight of cherries harvested.

Long-term production and returns

Because an orchard enterprise is necessarily a long-term venture, it is interesting to observe records showing the yields and prices obtained by growers over a long period of years (Table 28).

By applying official government indexes* of Oregon farm wages and of "prices paid by farmers for commodities, interest and taxes" to the respective 1946 cost data adjusted for annual variations in yield, it is possible to estimate the probable costs of production during the period 1932 to 1945. The data show that the annual yields obtained by a large group of growers in the Willamette Valley over the 14-year period, 1932-1945, averaged 2,079 pounds per acre. The estimated cost of production averaged \$7.98 per hundredweight, varying from \$3.63 per hundredweight in 1933 with a yield of 3,120

* Published by the Bureau of Agricultural Economics, U. S. Department of Agriculture.

Table 27. SWEET CHERRIES (FOR PROCESSING): COST OF PRODUCTION IN THE WIL-
LAMETTE VALLEY AND THE DALLES AREA IN OREGON, 1946; AND CALCULATED COSTS
FOR 1946, BASED ON THE AVERAGE YIELDS FOR THE 4-YEAR PERIOD 1943-1946,
THE 3-YEAR PERIOD 1943-1945, AND THE LOW-YIELD
YEAR 1945, RESPECTIVELY*

Item	Cost per 100 pounds with 1946 yield of 4,839 pounds	Calculated cost per 100 pounds in 1946		
		With 1943-1946 yield of 3,194 pounds	With 1943-1945 yield of 2,611 pounds	With 1945 yield of 2,320 pounds
<i>Labor</i>				
Pruning	\$.14	\$.21	\$.26	\$.29
Brush disposal .....	.04	.06	.07	.08
Cultivating .....	.08	.13	.15	.17
Fertilizing .....	.03	.05	.06	.06
Irrigating .....	.07	.10	.12	.14
Spraying and dusting .....	.08	.13	.16	.18
Grafting and hoeing .....	.06	.09	.11	.13
Picking	3.74	3.74	3.74	3.74
Hauling .....	.12	.12	.12	.12
Other harvest .....	.59	.59	.59	.59
Supervision and miscellaneous .....	.60	.91	1.11	1.25
TOTAL LABOR	\$5.55	\$ 6.13	\$ 6.49	\$ 6.75
<i>Materials</i>				
Sprays and dusts	\$.30	\$.46	\$.56	\$.63
Fertilizers and cover crop seed .....	.14	.21	.25	.28
Irrigation water and pumping .....	.04	.06	.08	.09
TOTAL MATERIALS	\$.48	\$.73	\$.89	\$ 1.00
<i>General Expense</i>				
Machinery repair	\$.22	\$.33	\$.41	\$.46
Building repair .....	.04	.06	.08	.09
Motor fuel and oil .....	.14	.21	.26	.29
Motor license and insurance .....	.04	.05	.07	.08
Pay roll insurance .....	.14	.14	.14	.14
Property taxes .....	.06	.09	.11	.12
Supplies, bees, trees .....	.09	.14	.17	.19
Telephone and office .....	.05	.08	.09	.10
Electricity, fire insurance, water .....	.02	.04	.04	.05
TOTAL GENERAL EXPENSE	\$.80	\$ 1.14	\$ 1.37	\$ 1.52
<i>Depreciation</i>				
Machinery	\$.36	\$.54	\$.66	\$.74
Buildings .....	.08	.12	.15	.17
Irrigation equipment .....	.04	.07	.09	.09
TOTAL DEPRECIATION	\$.48	\$.73	\$.90	\$ 1.00
<i>Interest</i>				
Machinery	\$.11	\$.16	\$.20	\$.22
Buildings .....	.08	.12	.14	.16
Irrigation equipment .....	.04	.06	.07	.08
Cash for operating .....	.12	.12	.12	.12
Orchard .....	.67	1.01	1.24	1.40
TOTAL INTEREST AT 5 PER CENT	\$1.02	\$ 1.47	\$ 1.77	\$ 1.98
TOTAL COST	\$8.33	\$10.20	\$11.42	\$12.25

* These data represent the average cost per acre in 1946 on 93 orchards, and the pro rata cost per hundredweight, adjusted for the variations in costs due to differences in yield per acre (yield data represent 1,798 acres in 1946, 1,598 acres in 1945, 1,513 acres in 1944, and 1,341 acres in 1943).

Table 28. SWEET CHERRIES (FOR PROCESSING): ESTIMATED COST, AND THE SEASONAL AVERAGE PRICE OF SWEET CHERRIES IN OREGON¹

Year	Yield per acre ²	Estimated cost per acre				Cost per 100 pounds	Price per 100 pounds ³	Per cent price is of cost
		Labor ³		Other costs ¹	Total cost			
		Harvest	Other					
	<i>Pounds</i>							
1932	1,780	\$ 20.11	\$12.80	\$ 75.55	\$108.46	\$ 6.09	\$ 2.25	37
1933	3,120	29.33	10.67	73.12	113.12	3.63	2.50	69
1934	1,620	17.50	12.27	79.21	108.98	6.73	3.75	56
1935	2,200	24.86	12.80	79.21	116.87	5.31	5.00	94
1936	1,980	25.15	14.40	77.99	117.54	5.94	4.25	72
1937	3,140	44.27	16.00	80.43	140.70	4.48	6.70	150
1938	1,700	23.29	15.46	76.77	115.53	6.80	2.80	41
1939	2,920	40.00	15.47	75.55	131.02	4.49	3.60	80
1940	3,220	45.40	16.00	75.55	136.95	4.25	4.90	115
1941	1,060	18.02	19.20	80.43	117.65	11.10	5.75	52
1942	1,420	34.08	27.20	91.39	152.67	10.75	6.35	59
1943	1,800	66.06	41.60	98.71	206.37	11.46	10.50	92
1944	2,040	86.50	48.01	103.58	238.09	11.67	13.10	112
1945	1,100	49.17	50.67	106.02	205.86	18.71	12.95	69
1946	4,839	227.80	53.34	121.86	403.00	8.33	13.15	158
Average	2,079	.....	.....	.....	.....	\$ 7.98	\$ 6.50	84

¹The estimated costs of production for the period 1932-1945 are based on cost data for the year 1946 from 93 orchards in the Willamette Valley and The Dalles area.

²The annual (and the average) yields represent the total production of 35,000,000 pounds delivered to the Willamette Cherry Growers, Inc., over the 14-year period 1932-1945. The yield of 4,839 pounds per acre for 1946 was the average production obtained from the 93 orchards studied in Oregon.

³The average cost of \$227.80 per acre (\$4.71 per hundredweight) for harvesting the 1946 crop of 4,839 pounds per acre, and other labor costs of \$53.34 per acre were taken as 100 in computing the indexes used in calculating estimated costs for other years. The cost of harvesting was calculated for each year on the basis of the average yield per acre. (The indexes of labor costs were computed from Oregon farm labor reports issued quarterly by the Bureau of Agricultural Economics, U. S. Department of Agriculture.)

⁴"Other costs," which include all costs other than labor, averaged \$121.86 per acre for 1946. This figure was taken as 100 in computing the indexes used in calculating estimated costs for other years. (The indexes of cost for items other than labor are based on the indexes of "prices paid by farmers for commodities, interest and taxes," with the index for September 1946 taken as 100. Source: *The Agricultural Situation*, Bureau of Agricultural Economics, U. S. Department of Agriculture, October 1946.)

⁵Oregon Extension Bulletin 660, *Farm Price Data*. (Prepared cooperatively by the Oregon State College Extension Service, Agricultural Economics Section, and the Division of Agricultural Statistics, Bureau of Agricultural Economics, U. S. Department of Agriculture.) Prior to the year 1938 the price includes sour as well as sweet cherries because separate figures are not available.

Table 29. SWEET CHERRIES (FOR PROCESSING): ESTIMATED COST IN THE WILLAMETTE VALLEY AREA, MARION, POLK, AND YAMHILL COUNTIES, AND THE SEASONAL AVERAGE PRICE OF SWEET CHERRIES IN OREGON¹

Year	Yield per acre ²	Estimated cost per acre				Cost per 100 pounds	Price per 100 pounds ⁵	Per cent price is of cost
		Labor ³		Other costs ⁴	Total cost			
		Harvest	Other					
	<i>Pounds</i>							
1932	1,780	\$ 20.47	\$ 9.66	\$ 65.96	\$ 96.09	\$ 5.40	\$ 2.25	42
1933	3,120	29.95	8.05	63.83	101.83	3.26	2.50	77
1934	1,620	17.98	9.26	69.15	96.39	5.95	3.75	63
1935	2,200	25.30	9.66	69.15	104.11	4.73	5.00	106
1936	1,980	25.74	10.87	68.09	104.70	5.29	4.25	80
1937	3,140	45.22	12.07	70.22	127.51	4.06	6.70	165
1938	1,700	23.63	11.67	67.03	102.33	6.02	2.80	46
1939	2,920	40.59	11.67	65.96	118.22	4.05	3.60	89
1940	3,220	46.37	12.07	65.96	124.40	3.86	4.90	127
1941	1,060	18.34	14.49	70.22	103.05	9.72	5.75	59
1942	1,420	34.79	20.53	79.79	135.11	9.52	6.35	67
1943	1,800	67.50	31.39	86.18	185.07	10.28	10.50	102
1944	2,040	88.33	36.22	90.43	214.98	10.54	13.10	124
1945	1,100	50.27	38.24	92.56	181.07	16.46	12.95	79
1946	4,293	206.56	40.25	106.39	353.20	8.22	13.15	160
AVERAGE	2,079	.....	.....	.....	.....	\$ 7.16	\$ 6.50	92

¹The estimated costs of production for the period 1932-1945 are based on cost data for the year 1946 from 48 orchards in the Willamette Valley.

²The annual (and the average) yields represent the total production of 35,000,000 pounds delivered to the Willamette Cherry Growers, Inc., over the 14-year period 1932-1945. The yield of 4,293 pounds per acre for 1946 was the average production obtained from the 48 orchards studied in the region.

³The average cost of \$206.56 per acre (\$4.81 per hundredweight) for harvesting the 1946 crop of 4,293 pounds per acre, and other labor costs of \$40.25 per acre were taken as 100 in computing the indexes used in calculating estimated costs for other years. The cost of harvesting was calculated for each year on the basis of the average yield per acre. (The indexes of labor costs were computed from Oregon farm labor reports issued quarterly by the Bureau of Agricultural Economics, U. S. Department of Agriculture.)

⁴"Other costs," which include all costs other than labor, average \$106.39 per acre for 1946. This figure was taken as 100 in computing the indexes used in calculating estimated costs for other years. (The indexes of cost for items other than labor are based on the indexes of "Prices paid by farmers for commodities, interest and taxes," with the index for September 1946 taken as 100. Source: *The Agricultural Situation*, Bureau of Agricultural Economics, U. S. Department of Agriculture, October 1946.)

⁵Oregon Extension Bulletin 660, *Farm Price Data*. (Prepared cooperatively by the Oregon State College Extension Service, Agricultural Economics Section, and the Division of Agricultural Statistics, Bureau of Agricultural Economics, U. S. Department of Agriculture.) Prior to the year 1938 the price includes sour as well as sweet cherries because separate figures are not available.



Figure 10. These cherry trees, planted on Willamette silt loam 18 years ago, are spaced only 30 feet apart on the square system. They have been topped after harvest each season for the last eight years to keep their height down to 20 feet. Pruning after harvest seems to avoid many water sprouts. This orchard has had vetch cover crops each year and either landplaster or ammonium sulphate applications. Yields over the past six years have averaged two tons per acre.

pounds per acre to \$18.71 per hundredweight in 1945 with a yield of only 1,100 pounds. The price of cherries averaged \$6.50 per hundredweight during this entire period (including the year 1946) or 84 per cent of the estimated cost. In only four of the 15 years, 1932-1946, did the price received exceed the estimated cost of production. The estimates for the orchards in the central Willamette Valley are quite similar to those for the region as a whole (Table 29). These estimates indicate very clearly the extent to which the wide fluctuations in yield affected the cost, and the price of sweet cherries (for processing) over the period from 1932 to 1946, inclusive.

Conclusions

Why have cherry growers generally continued their operation despite so many years of adverse conditions? Many, of course, have had better-than-average results over a period of years. Others, obviously, have received little or no return from their orchard invest-

ment, and only small returns for the use of their equipment and labor.

When an orchard is only part of the farm business, the operator is less dependent on one enterprise for his total income. In case of his orchard, the grower looks forward hopefully to future prospects of good yields and satisfactory prices rather than to the prospect of changing to some other enterprise. Orchard management is a long-term undertaking. Unfortunately a period of poor returns may result in less attention to management and thereby cause deterioration in value of the planting and even in the quality of fruit produced.

The individual grower's primary concern is to strive for efficiency in his operations by improving the yield and quality of his product, thereby reducing his cost per pound and assuring himself the maximum price obtainable for his crop. Rigid adherence to this policy will enable him to compete advantageously with other growers.

Good farm management practice suggests that, although cherry production usually involves a large investment per acre and requires considerable technical knowledge on the part of the producer, specialization is not advisable for most farmers. An orchard does not lend itself to a crop-rotation plan or contribute materially to a livestock-production program. Yet, the farmer who adopts a diversified production program is able to employ his farm machinery, power equipment, and his own and family labor more advantageously over the entire year than the specialized farmer with a one-crop system.

When adverse conditions arise in the cherry enterprise, moreover, the diversified farmer with a relatively small acreage in cherries along with some other enterprises is able to retrench more effectively with regard to cash expenditures. These include labor, because his family is able to substitute in a large part for the hired labor ordinarily employed.

The large-scale operator, on the other hand, is much more concerned about the necessity of obtaining good yields and high prices. He is largely, if not entirely, dependent on his receipts from cherries to pay the operating expense, which often represents a considerable short-term obligation for money borrowed. Consequently, he may face a serious situation whenever his crop yield is small or the price unusually low. If he has no other resource to draw upon until the next crop is harvested, the financing of future operations following a disastrous year or two is often difficult for him and sometimes impossible.

The findings in this study, by pointing out the importance of good yields of high-quality cherries produced at a reasonably low

production cost per pound, should be helpful to the individual grower interested in improving his business. Having the data in terms of physical requirements, such as the hours of labor and machinery used per acre, the approximate cost of production for any other period may be estimated by simply adjusting for any changes in the scale of wages and other items of cost. The chief variable in the cost of producing cherries would be the labor factor. Any difference in the cost of production, therefore, would be due almost entirely to changes in the wage rates for labor.

Appendix

METHODS USED IN OBTAINING, COMPILING, AND ANALYZING THE DATA

The data for this study were collected by the survey method. Each cooperating grower was visited at the end of the year for the purpose of obtaining a complete business record on the bearing cherry acreage. Analysis of the data was made chiefly by grouping and cross-tabulating. Many of the details entered on the schedule were the farmer's carefully checked estimates. Sufficient time was spent with each grower to work out thoroughly all the facts pertaining to the year's operations.

JOINT COSTS: Those farm expenses that were incurred only in part for the cherry enterprise were charged to the cherries in proportion to the benefit received. The investment in machinery and buildings used jointly was likewise apportioned according to use.

RENT: A few growers rented land, buildings, or equipment. The renter was treated as an owner and was charged interest, taxes, and depreciation in lieu of rent, in order to make all farms comparable on an investment basis.

LABOR: A very complete form was used to compile the various labor operations performed in cherry production. Although the *total* yearly labor on an enterprise is an indefinite figure in the minds of many farmers, the grower can be quite definite about the labor required for each individual operation. The enumerator recorded for each operation the farmer's estimate of the work done by himself, members of his family, and by hired labor. As most of the estimates were on an hour basis, the wage rates were also expressed on the hourly basis, including the value of any board furnished. The wage rate for family labor was gauged by wages paid to hired labor for comparable work.

In addition to the time that the farmer spends at specified jobs he generally puts in considerable time that should be charged as overhead against his enterprises. Each cooperator was asked to apportion his total year's time among his enterprises. From his estimate for the cherry enterprise, the actual time he had spent on the direct orchard work was deducted, and the remainder was then entered as supervision and miscellaneous work.

CONTRACT LABOR: Expenditures for contract work were divided between wages for the man labor involved and rental value of the equipment furnished.

INTEREST: The present investment or inventory value of orchard and equipment was estimated, and interest was charged uniformly at 5 per cent.

DEPRECIATION: Depreciation on buildings and equipment was obtained by dividing the present (depreciated) value by the remaining years of usefulness. No depreciation was charged against the cherry planting. Appreciation on the young orchards would partially offset depreciation on older plantings.

MACHINERY OPERATION COST: Interest and depreciation on machinery were computed separately from daily operation costs. Total machinery cost, therefore, may be obtained by adding together the operating costs, interest and depreciation.