



Cooperative Extension

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# **1985 Estimated Cost Of Producing Red Delicious Apples, Columbia Basin, Central Washington**

**Farm Business Management Reports**

### NOTE

Enterprise costs and returns vary from one farm to the next and over time for any particular farm. Variability stems from differences in:

- . Capital, labor, and management resources.
- . Type and size of machinery complement.
- . Cultural practices.
- . Size of farm and enterprise.
- . Crop yields.
- . Input prices.
- . Commodity prices.

Costs can also be calculated differently depending on the intended use of the cost estimate. The information in this publication serves as a general guide for a modern, well managed Columbia Basin apple orchard. To avoid drawing unwarranted conclusions for any particular farm or group of farms, the reader must closely examine the assumptions used. If they are not appropriate for the situation at hand, adjustments in the costs and/or returns should be made.

1985 ESTIMATED COST OF PRODUCING RED DELICIOUS APPLES,  
COLUMBIA BASIN, CENTRAL WASHINGTON

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INTRODUCTION

Apples are one of the top five agricultural commodities in Washington. Their production, storage, packing, and processing is the basis for much of the economy throughout central Washington. During the past few years, the industry has expanded rapidly. According to the U.S. Census of Agriculture, Washington apple acreage increased from 96,500 acres in 1974 to 145,630 acres by 1982.

Much of this expansion has occurred on the broader slopes and benches east of the Cascade Mountains in central Washington. One of the principal centers is in the Columbia Basin, represented by Grant, Adams, and Franklin counties. In this area, the acreage has increased from 4,275 acres in 1975 to 21,297 acres in 1983.

Along with this rapid expansion, there have also been significant changes in orchard design. These changes have increased productivity and improved management capabilities. These changes include use of superior coloring strains of Red Delicious with the spur type growth habit. With dwarf rootstocks, it is possible to grow smaller, more manageable trees at a closer planting distance. Pollenizers as inter-plants permit solid block planting of individual cultivars (variety and strains). Less expensive permanent irrigation systems make it possible to closely regulate tree performance.

OBJECTIVES AND LIMITATIONS OF THE STUDY

A study published in January 1985, "Cost of Establishing an Apple Orchard, Columbia Basin, Central Washington," EB 0960 (revised), assumed the planting of 50 acres of land to Red Delicious apples according to the most modern design. The objective of this study is to project what such a planting, when mature, requires in the way of equipment, materials, supplies, and labor and the potential returns. Readers must remember that such an orchard operation is not typical. Few orchards are planted all at one time to a single cultivar. Most operations consist of a series of plantings, and therefore, the average of all plantings would be different than represented in this study.

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Many factors can alter the costs reported in this publication as well as the packout and returns. Therefore, these figures should not be used to represent average costs and returns to an individual grower. The data should be viewed as representative of what knowledgeable and skilled fruit growers might anticipate. We recommend that individual growers use the blanks on the right-hand side of various budget tables to estimate their own costs and returns. The primary value of this report is to identify practices and performances considered typical of a modern and well-managed orchard enterprise. While this publication does not represent an average of all growers and is not intended to be a guide to production practices, it does indicate current production trends. As such, it should be helpful in estimating the physical and financial requirements of comparable plantings.

#### SOURCES OF INFORMATION

The assumptions of this study were based on information obtained from a knowledgeable group of experienced fruit growers with sizeable plantings in the Columbia Basin area. Their production practices and requirements for labor, equipment, and supplies are the basis for the assumptions. Columbia Basin suppliers provided information on current prices for equipment, custom operations, chemicals, and power. The Grant County Assessor's Office provided the estimates of land prices and property taxes.

#### BUDGET ASSUMPTIONS

The assumptions used in developing this budget are:

1. The orchard is 50 acres including roads, buildings, and wind-break. It was assumed that 93% or 46.5 acres were actually planted. The per-acre costs are calculated on a per-acre planted basis, not on the total acres of land.
2. Trees are all free-standing, spur type, Red Delicious on a semi-dwarfing rootstock, 10 to 14 years of age.
3. Tree spacing is 9 feet x 18 feet with pollenizer trees interseted every sixth tree in every third row. This spacing results in 268 Red Delicious trees plus 27 pollenizer trees or a total of 295 trees per planted acre.
4. An under-tree, solid set, permanent sprinkler irrigation system is used.
5. The trees have an expected 25-year life; 5 years of establishment and 20 years of production.
6. New purchase costs (1985) are used for all machinery, equipment, and buildings. The use of new purchase prices may overstate costs currently being experienced by fruit growers. However, it provides an indication of the earnings needed to replace depreciable assets. Recent increases in prices paid for new machinery

and equipment mean that the depreciation claimed on older purchases substantially understates the amount of capital required to replace that asset. When looking at the long-term viability of an enterprise, it is important to consider its ability to replace its depreciable assets on a new cost basis.

7. Production is assumed to be 54 bins (1,350 loose field boxes) per planted acre. In field run returns, a rate of 80% premium grade extra fancy is assumed with 5% cullage, giving a gross return to the orchard of \$100 per bin. These production levels and returns are considered typical of mature spur-type Red Delicious in the Columbia Basin. They are not typical, however, of all orchards, either in the Columbia Basin or in other parts of the state. Most orchards contain a series of plantings and cultivars of different ages and conditions. The presence of new or young plantings would decrease the average production while the presence of other cultivars would affect packout and orchard returns.
8. The property tax on the orchard and irrigation system is \$47 per acre.
9. Labor is valued at \$6.30 per hour. This includes wages, industrial insurance, social security, and the cost of other fringe benefits.

The assumptions above require careful study and consideration. The broad slopes and even terrain found in the Columbia Basin make it possible to use a high proportion of the land. The spur-type Red Delicious is typical of the area. It is popular with growers because of its high profit potential.

#### ANNUAL PRODUCTION COST

Estimated production costs are shown in two tables. Table 1 outlines the schedule of field operations by calendar month, the type of equipment and labor used, and the hours used per acre.

The costs of field operations are divided into two categories. The first is the cost of equipment, irrigation, buildings, and land ownership, all representing fixed costs. The second category, variable costs, is associated with operating the equipment, hiring labor, and purchasing services and materials. Total cost is the sum of fixed and variable costs.

Equipment fixed costs include depreciation, interest on the average investment, property taxes, and insurance. These costs are incurred whether or not a crop is grown and do not vary with the enterprise, given ownership of a specific equipment complement. Per-hour fixed costs for equipment are determined by dividing the total annual fixed cost per machine by the annual hours of equipment use over all enterprises for the representative farm. For a specific field operation, equipment fixed costs are determined by multiplying the equipment hours per acre times the equipment per-hour fixed cost. Fixed costs

for the irrigation system, the machine shed, shop, and some miscellaneous equipment are determined on a per-acre basis by dividing the total annual fixed cost by the number of acres.<sup>1/</sup>

Land costs are based on rental agreements typical for bare land in the area. While the owner-operator obviously will not actually experience a land rental cost, the cost represents the returns the owner-operator must have, apart from appreciation of land value, to justify keeping the capital invested in orchard land and continuing to farm the land. As used in this publication, land cost is termed an opportunity cost to indicate that it is not an out-of-pocket expense, but rather a return that is foregone as a result of the owner-operator farming the land instead of renting the land to a tenant.

Amortized establishment cost represents costs incurred during the establishment years (minus revenues during those years) that must be recaptured during the productive years. Per-acre establishment costs for Red Delicious apples, summarized from EB 0960, "1985 Cost of Establishing an Apple Orchard, Columbia Basin, Washington," total \$8,963.<sup>2/</sup> Amortizing this cost over a 20-year period, assuming a 14% interest rate, means that \$1,353.29 of establishment costs need to be added each year to the current-year production costs.

Variable costs depend directly on the number of acres produced. These costs include fuel, oil, repairs, fertilizer, chemicals, custom work, overhead, and interest on operating capital. Labor is also included as a variable cost.

The second table, Table 2, presents a summary of costs appearing in Table 1. Most items are self-explanatory. However "Machinery Interest," "Building Interest," and "Irrigation Interest" warrant additional explanation. These figures represent opportunity costs (returns foregone by investing in the given equipment, buildings, and irrigation complement rather than in alternative investments) or interest paid to finance the given equipment, buildings, and irrigation complement. Total interest cost on these capital purchases is calculated on the average value of the equipment, buildings, and irrigation system over their respective years of use. The 14% interest charge made against this "average" value represents the total interest cost.

#### DISCUSSION OF PRODUCTION PRACTICES

The practices used in this study, and outlined in Table 1, warrant some clarification. Pruning and training are performed during the dormant period with no summer pruning. Because of the size of the trees, only hand tools are used. Prunings are chopped up with the rotary mower during the mowing operations except where large limbs must be cut up with a chain saw and removed.

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<sup>1/</sup> Per-hour (acre) fixed and variable costs for equipment and buildings are in Table 5.

<sup>2/</sup> Establishment costs are summarized in Table 4.

Chemical applications applied throughout the year are summarized in Table 3. Primary emphasis on insect control is during March-April with dormant and prebloom sprays. Insects damaging the fruit require additional cover sprays in May and June. Frost control is not considered a requirement under this particular set of circumstances.

Fruit thinning requires a chemical thinning in May plus hand thinning in June. The primary application of fertilizer is 80 pounds of nitrogen applied with a ground applicator in November. In April, zinc and organophosphorous pesticide is applied with the dormant oil. Boron is applied in the prebloom spray. Weed control requires the application of herbicides in April, June, and November. Gopher and mouse control, a persistent problem, requires ground application of strychnine oats for gophers and aerial application of baits for mice in November.

The use of grass sod requires five mowings per year; each mowing requires two trips across the field to complete the mowing of the space between rows. Irrigation, with a solid set system requires 30-acre inches of water per year on a 10-day cycle from late May until early September, plus a final irrigation in October.

The harvest operation consists of the preharvest distribution of bins throughout the plantings. A two- to three-week harvest period in September is assumed, using 30 pickers, a supervisor, two checkers, three tractors to haul bins out of the orchard, and one tractor to load trucks. Bins are custom hauled to the warehouse.

#### EQUIPMENT AND BUILDING COMPLIMENT

Table 5 presents the equipment and building complement used to derive the cost estimates. It includes current purchase prices, annual hours of use, and per-hour or per-acre fixed and variable costs.

Equipment and building fixed costs include depreciation and interest on investment, property taxes, and insurance; costs that do not vary with the number of acres produced. It should be noted that interest on investment represents a 14% opportunity cost to the enterprise. These are earnings foregone by investing money in the equipment and building complement rather than an alternative investment. This may also represent interest on funds borrowed to finance equipment and building purchases.

Equipment variable costs include equipment repair, electricity, fuel, and lubrication costs; costs that vary with the crop grown or the number of acres produced.

#### SUMMARY OF RECEIPTS, COSTS, AND PROFITABILITY PER ACRE

Per-acre costs, returns, and profitability under the given budget assumptions are presented in Table 6. Gross receipts are based on the assumption of 54 bins per acre returning \$100 per bin. Final returns are calculated as net returns to land and management. This is the return the owner-operator realizes to the investment in land and

management after accounting for all costs including \$6.30 per hour for any labor the owner-operator contributed to the production of the crop.

#### BREAK-EVEN RETURNS

Break-even returns to the fruit grower for different levels of enterprise costs are presented in Table 7. The first break-even return is that necessary to cover total variable costs--those costs that occur only if the crop is produced. If the return received does not equal or exceed this break-even return, then producing apples becomes uneconomical, even in the short-run, for the added costs of production are greater than the added returns.

The second break-even return is that necessary to cover total cash costs, assuming no interest on outstanding loans or land rent. If other cash costs do exist on an individual's farm, these costs must be identified and included in the cash cost break-even return calculation. This return may be viewed as that return necessary to economically produce in the short-run.

The third break-even return is that of total cash cost plus depreciation on machinery, buildings, and the irrigation system. This return must be realized to stay in business over the long-run.

However, if farmers do not include past establishment costs and the opportunity costs they forego from their investments in land, equipment, and buildings in calculating their total cost break-even return, they are overlooking the profitability of farming relative to alternative uses of their resources. Only if the fourth break-even value, the total cost break-even return, is received, will the owner-operator be able to recover all out-of-pocket expenses, plus realize a competitive return to equity capital invested in land, trees, equipment, and buildings. Failure to obtain the fourth break-even return means that the owner-operator will not receive a return on capital contributions equal to what could have been earned in an alternative use. Attainment of a return above the fourth break-even level means that in addition to covering all cash and opportunity costs, the operator will get a return to management and to the risk assumed.

#### EFFECT OF PRICE AND YIELD VARIATIONS UPON PROFITABILITY

As previously stated, this study represents what knowledgeable fruit growers might anticipate from a planting of Red Delicious apples in their prime production years. To be of practical use to potential investors, the assumptions require careful study. In the calculations demonstrating profitability and break-even returns an average production level of 54 bins per acre is assumed. This is what experienced growers calculate they can average. However, for the inexperienced





TABLE 1: SCHEDULE OF OPERATIONS AND COSTS PER ACRE FOR PRODUCING APPLES IN THE COLUMBIA BASIN OF WASHINGTON STATE.\*

OPERATION	TOOLING	MONTH	MACH. HOURS	LABOR HOURS	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST
					FIXED COST	FUEL, OIL, LUBE, AND REPAIRS	LABOR	SERVICE MATERIALS			
					\$	\$	\$	\$	\$	\$	\$
PRUNE & TRAIN	HAND LABOR, PRUNING TOOLS	DEC-MAR	0.0	85.00	5.36	0.0	535.50	0.0	0.0	535.50	540.86
BUCK&COL.LIMBS	HAND LABOR, CHAINSAW	MAR	0.90	1.08	1.53	2.88	6.80	0.0	0.0	9.68	11.21
BUCK&COL.LIMBS	35HP-WT, TRAILER	MAR	0.90	1.08	9.58	1.99	6.80	0.0	0.0	8.79	18.37
CHOP BRUSH(2X)	60HP-WT, 9' MOWER	MAR	1.50	1.80	20.46	11.36	11.34	0.0	0.0	22.70	43.16
DORMANT SPRAY	60HP-WT, BLAST SPRAYER	MAR-APR	0.40	0.48	6.48	11.88	3.02	0.0	57.72	72.62	79.10
PREBLOOM SPRAY	60HP-WT, BLAST SPRAYER	APR	0.40	0.48	6.48	11.88	3.02	0.0	16.67	31.57	38.05
PREBLOOM SPRAY	60HP-WT, BLAST SPRAYER	APR	0.40	0.48	6.48	11.88	3.02	0.0	15.12	30.02	36.50
GROWTH REG.SPRAY	60HP-WT, BLAST SPRAYER	APR-MAY	0.40	0.48	6.48	11.88	3.02	0.0	55.00	69.90	76.38
BLOSSOM SPRAY	60HP-WT, BLAST SPRAYER	APR-MAY	0.40	0.48	6.48	11.88	3.02	0.0	21.54	36.44	42.92
THINNING SPRAY	60HP-WT, BLAST SPRAYER	MAY	0.40	0.48	6.48	11.88	3.02	0.0	4.38	19.28	25.76
IRRIGATE	SOLID SET, 30AC.IN.	MAY-OCT	0.0	3.00	117.07	36.60	18.90	28.68	0.0	84.18	201.25
MOW COVER(5X)	60HP-WT, 9' MOWER	JULY	2.50	3.00	34.11	18.93	18.90	0.0	0.0	37.83	71.94
HERB. APPLIC.	35HP-WT, WEED SPRAYER	APR	0.33	0.40	3.85	0.77	2.52	0.0	5.59	8.88	12.73
COVER SPRAY	60HP-WT, BLAST SPRAYER	MAY	0.40	0.48	6.48	11.88	3.02	0.0	12.20	27.10	33.58
COVER SPRAY	60HP-WT, BLAST SPRAYER	JUNE	0.40	0.48	6.48	11.88	3.02	0.0	10.88	25.78	32.26
HERB. APPLIC.	35HP-WT, WEED SPRAYER	JUNE	0.33	0.40	3.85	0.77	2.52	0.0	3.83	7.12	10.97
HAND THINNING	HAND LABOR,LADDERS	JUNE-JLY	0.0	44.00	2.35	2.25	277.20	0.0	0.0	279.45	281.80
SUPERVISOR	THINNING SUPERVISOR	JUNE-JLY	0.0	4.40	0.0	0.0	27.72	0.0	0.0	27.72	27.72
COVER SPRAY	60HP-WT, BLAST SPRAYER	JULY	0.40	0.48	6.48	11.88	3.02	0.0	54.56	69.46	75.94
STOP DROP SPRAY	CUSTOM AERIAL**	AUG	0.0	0.0	0.0	0.0	0.0	9.00	0.18	9.18	9.18
BIN DISTRIBUTN	35HP-WT, BACKFORK	SEPT	2.00	2.40	16.88	3.99	15.12	0.0	0.0	19.11	35.99
BIN DISTRIBUTN	35HP-WT, BACKFORK(RENTED)	SEPT	4.00	4.80	0.0	5.40	30.24	25.40	0.0	61.04	61.04
PICKING	PICKING LABOR, PICKING SACKS	SEPT	0.0	0.0	6.17	2.25	0.0	486.00	0.0	488.25	494.42
SUPERVISOR	HARVEST SUPERVISOR	SEPT	0.0	0.0	0.0	0.0	0.0	27.00	0.0	27.00	27.00
CHECKING	CHECKERS	SEPT	0.0	3.30	0.0	0.0	20.79	0.0	0.0	20.79	20.79
SWAMP	35HP-WT, BACKFORK	SEPT	2.00	2.67	16.88	3.99	16.80	0.0	0.0	20.79	37.67
SWAMP	35HP-WT, BACKFORK(RENTED)	SEPT	4.00	5.33	0.0	5.40	33.58	25.40	0.0	64.38	64.38
LOAD	60HP-WT, HIGHLIFT FORK	SEPT	2.00	2.67	31.04	8.12	16.80	0.0	0.0	24.92	55.96

TABLE 1: SCHEDULE OF OPERATIONS AND COSTS PER ACRE FOR PRODUCING APPLES IN THE COLUMBIA BASIN OF WASHINGTON STATE, CONTINUED.\*

OPERATION	TOOLING	MONTH	MACH. HOURS	LABOR HOURS	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST
					FIXED COST	FUEL, OIL, LUBE, AND REPAIRS	LABOR	SERVICE	MATERIALS		
					\$	\$	\$	\$	\$	\$	\$
HAULING	CUSTOM HAULING & BIN RENTAL	SEPT	0.0	0.0	0.0	0.0	0.0	297.00	0.0	297.00	297.00
CLEANUP	35HP-WT, TRAILER	OCT	0.25	0.30	2.66	0.55	1.89	0.0	0.0	2.44	5.10
FERTILIZE	35HP-WT, FERT. SPREADER	NOV	0.25	0.30	5.46	1.18	1.89	0.0	29.52	32.59	38.05
HERB. APPLIC.	35HP-WT, WEED SPRAYER	NOV	0.33	0.40	3.85	0.77	2.52	0.0	6.68	9.97	13.82
GOPHER CONTROL	60HP-WT, GOPHER MACHINE	NOV	0.33	0.40	5.72	1.77	2.49	0.0	4.60	8.86	14.58
MOUSE CONTROL	CUSTOM AERIAL	NOV	0.0	0.0	0.0	0.0	0.0	6.00	11.70	17.70	17.70
MISC USE	1/2 TON PICK-UP	ANNUAL	10.00	12.00	50.54	53.99	75.60	0.0	0.0	129.59	180.13
MISC USE	SHOP TOOLS	ANNUAL	0.0	0.0	12.13	0.0	0.0	0.0	0.0	0.0	12.13
MISC USE	THREE-WHEELER	ANNUAL	3.00	3.60	8.73	16.91	22.68	0.0	0.0	39.59	48.32
MACHINE SHED	32X72	ANNUAL	0.0	0.0	55.28	0.0	0.0	0.0	0.0	0.0	55.28
INTEREST	OPERATING CAPITAL	ANNUAL	0.0	0.0	0.0	0.0	0.0	111.12	0.0	111.12	111.12
OVERHEAD	UTILITIES,LEGAL,ACCT.,ETC.	ANNUAL	0.0	0.0	0.0	0.0	0.0	139.42	0.0	139.42	139.42
TAXES	LAND AND IRRIGATION	ANNUAL	0.0	0.0	47.00	0.0	0.0	0.0	0.0	0.0	47.00
LAND COST	NET RENT	ANNUAL	0.0	0.0	110.00	0.0	0.0	0.0	0.0	0.0	110.00
ESTAB. COST	INTEREST ON INVESTMENT	ANNUAL	0.0	0.0	1353.29	0.0	0.0	0.0	0.0	0.0	1353.29
TOTAL PER ACRE			38.22	186.65	1982.11	286.79	1175.78	1155.02	310.17	2927.76	4909.87

\* ASSUMES A 50 ACRE ORCHARD WITH 93% OF THE LAND IN TREES.

\*\* AVERAGE OF ONE AND ONE-HALF TIMES PER YEAR.

TABLE 2: SUMMARY OF PRODUCTION COSTS PER ACRE FOR PRODUCING APPLES IN THE COLUMBIA BASIN OF WASHINGTON STATE.

	UNIT	PRICE OR COST/UNIT	QUANTITY	VALUE OR COST	YOUR FARM
<b>VARIABLE COSTS</b>					
<b>PREHARVEST</b>					
SUPERIOR OIL	GAL.	2.85	6.00	\$ 17.10	_____
ORANGOPHOSPHOROUS	PT.	3.16	3.00	9.48	_____
THIODAN	QT.	7.50	3.00	22.50	_____
THIODAN	LBS.	4.38	3.00	13.14	_____
ZINC CHELATE	GAL.	4.32	2.00	8.64	_____
FUNGICIDE	PT.	6.67	2.50	16.67	_____
SOLUBOR	LBS.	0.66	5.00	3.30	_____
GROWTH REGULATOR SPRAY	ACRE	55.00	1.00	55.00	_____
ELGETOL	PT.	3.59	6.00	21.54	_____
SEVIN	LBS.	2.10	2.00	4.20	_____
NAA	OZ.	0.09	4.00	0.36	_____
GUTHION	LBS.	5.44	6.00	32.64	_____
MITICIDE	LBS.	20.79	2.00	41.58	_____
SYSTOX	PT.	4.20	0.50	2.10	_____
2,4-D	QT.	3.73	1.83	6.82	_____
X-77	QT.	3.76	0.17	0.62	_____
PARAQUAT	QT.	12.00	0.17	1.98	_____
NITROGEN	LBS.	0.369	80.00	29.52	_____
KARMEK	LBS.	0.66	0.67	0.44	_____
SINBAR	LBS.	18.91	0.33	6.24	_____
STRYCHNINE OATS	LBS.	1.15	4.00	4.60	_____
ROZOL	LBS.	1.17	10.00	11.70	_____
CUSTOM AERIAL	ACRE	6.00	2.50	15.00	_____
IRRIG. CHARGE	ACRE	28.68	1.00	28.68	_____
MACHINERY REPAIR	ACRE	191.62	1.00	191.62	_____
MACHINERY FUEL	ACRE	25.09	1.00	25.09	_____
MACHINERY LUBE	ACRE	3.76	1.00	3.76	_____
IRRIGATION REPAIR	ACRE	15.00	1.00	15.00	_____
IRRIGATION FUEL	ACRE	18.90	1.00	18.90	_____
IRRIGATION LUBE	ACRE	2.70	1.00	2.70	_____
HAND LABOR	HOURL	6.30	129.00	812.70	_____
THINNING SUPERVISOR	HOURL	6.30	4.40	27.72	_____
LABOR (MACHINERY)	HOURL	6.30	28.78	181.26	_____
LABOR (IRRIGATION)	HOURL	6.30	3.00	18.90	_____
INTEREST ON OP. CAP.	DOL.	0.14	793.72	111.12	_____
OVERHEAD COST	DOL.	0.05	2788.37	139.42	_____
SUBTOTAL, PRE-HARVEST				\$1902.04	_____
<b>HARVEST COSTS</b>					
35 HP-WT. (RENTED)	HOURL	6.35	8.00	\$ 50.80	_____
CUSTOM HAULING	BIN	3.00	54.00	162.00	_____
BIN RENTAL	BIN	2.50	54.00	135.00	_____
MACHINERY REPAIR	ACRE	9.15	1.00	9.15	_____
MACHINERY FUEL	ACRE	17.84	1.00	17.84	_____
MACHINERY LUBE	ACRE	2.71	1.00	2.71	_____
PICKING LABOR	BIN	9.00	54.00	486.00	_____
SUPERVISOR	BIN	0.50	54.00	27.00	_____
CHECKERS	HOURL	6.30	3.30	20.79	_____
LABOR (MACHINERY)	HOURL	6.30	18.16	114.43	_____
SUBTOTAL, HARVEST				\$1025.72	_____
TOTAL VARIABLE COST				\$2927.76	_____

TABLE 2: SUMMARY OF PRODUCTION COSTS PER ACRE FOR PRODUCING APPLES IN THE COLUMBIA BASIN OF WASHINGTON STATE, CONTINUED.

	UNIT	PRICE OR COST/UNIT	QUANTITY	VALUE OR COST	YOUR FARM
FIXED COSTS					
MACHINERY DEPRECIATION	ACRE	141.26	1.00	\$ 141.26	_____
MACHINERY INTEREST	ACRE	137.99	1.00	137.99	_____
MACHINERY INSURANCE	ACRE	5.90	1.00	5.90	_____
MACHINERY TAXES	ACRE	14.30	1.00	14.30	_____
BUILDING DEPRECIATION	ACRE	10.84	1.00	10.84	_____
BUILDING INTEREST	ACRE	37.94	1.00	37.94	_____
BUILDING INSURANCE	ACRE	1.63	1.00	1.63	_____
BUILDING TAXES	ACRE	4.88	1.00	4.88	_____
IRRIGATION DEPRECIATION	ACRE	48.00	1.00	48.00	_____
IRRIGATION INTEREST	ACRE	67.20	1.00	67.20	_____
IRRIGATION INSURANCE	ACRE	1.88	1.00	1.88	_____
TAXES (LAND)	ACRE	47.00	1.00	47.00	_____
AMORTIZED ESTAB. COST*	ACRE	0.151	8963.01	1353.29	_____
LAND (NET RENT)	ACRE	1.00	110.00	110.00	_____
				-----	
TOTAL FIXED COSTS				\$1982.11	_____
TOTAL COSTS				\$4909.87	_____

\*ESTABLISHMENT COST AMORTIZED OVER 20 YEARS AT 14% INTEREST.

Table 3. Summary of Chemical Applications Applied per Acre to the Red Delicious Apple Orchard.

Operation	Month	Chemical Applied
Dormant Spray	March-April	6 gal. of Superior Oil 3 pts. of Organophosphorus 3 qts of Thiodan 2 gal. of Zinc Chelate
Prebloom Spray	April	2.5 pts. of Fungicide
Prebloom Spray	April	3 lbs. of Solubor 3 lbs. of Thiodan
Herbicide Application	April	1.5 qts. of 2,4-D
Growth Regulator Spray	April-May	Mix varies (approximately \$55/acre)
Blossom Spray	April-May	3 qts. of Elgetol
Thinning Spray	May	2 lbs. of Sevin 2 oz. of NAA
Cover Spray	May	2 lbs. of Guthion 2 lbs. of Solubor
Cover Spray	June	2 lbs. of Guthion
Herbicide Application	June	1/3 qt. of 2,4-D 1/3 pts. of X-77 1/3 pts. of Paraquat
Cover Spray	July	2 lbs. of Guthion 2 lbs. of Miticide 1/2 pt. of Systox
Stop Drop Spray <sup>*/</sup>	August- September	1 1/3 oz. of NAA
Fertilize	November	80 lbs. of Nitrogen
Herbicide Application	November	2/3 lb. of Karamex 1/3 lb. of Sinbar
Gopher Control	November	4 lbs. of Strychnine Oats
Mouse Control	November	10 lbs. of Rozol

<sup>\*/</sup> Stop drop spray applied an average of 1.5 times per year at the rate of 1 1/3 oz. of NAA per application.



Table 5. 1985 Equipment and Building Complement for Semi-Dwarfing Apple Orchard, Columbia Basin, Washington.

Item	Number of Units	Annual		Value per Unit	Cost per Hour (acre) of Use							
		Hrs. of Use per Unit	Years of Life		Fixed Cost				Variable Cost			Total Cost
					Depr.	Interest <sup>a/</sup>	Ins./Taxes	Total	Repair	Fuel/Lube	Total	
				\$	\$	\$	\$	\$	\$	\$	\$	\$
Wheel Tractor, 60 HP	1	465	10	24,900	3.77	4.86	0.69	9.32	1.41	2.02	3.43	12.75
Wheel Tractor, 35 HP	1	350	10	14,400	3.38	4.35	0.62	8.35	0.63	1.35	1.98	10.33
Pickup, 1/2 Ton	1	500	6	11,400	2.70	2.06	0.29	5.05	4.73	0.68	5.41	10.46
Three-Wheeler	1	150	7	2,000	1.73	1.02	0.16	2.91	4.96	0.68	5.64	8.55
Chainsaw	1	50	4	275	1.19	0.44	0.07	1.70	1.86	1.35	3.21	4.91
PTO Blast Sprayer, 400 Gal.	1	180	10	7,000	3.20	3.20	0.49	6.89	26.27	0.0	26.27	33.16
Trailer	1	65	15	1,000	0.93	1.18	0.19	2.54	0.24	0.0	0.24	2.78
Highlift Forklift	1	100	10	3,500	2.88	2.88	0.44	6.20	0.63	0.0	0.63	6.83
Backfork	1	200	10	100	.04	.04	0.01	0.09	0.02	0.0	0.02	0.11
Weed Sprayer, 100 Gal.	1	50	10	900	1.48	1.48	0.22	3.19	0.34	0.0	0.34	3.53
Rotary Mower, 9 ft.	1	200	10	4,880	2.01	2.01	0.30	4.32	4.14	0.0	4.14	8.46
Fertilizer Spreader	1	25	10	1,900	6.35	6.20	0.95	13.50	2.76	0.0	2.76	16.26
Gopher Machine	1	17	15	913	3.24	4.12	0.66	8.02	1.94	0.0	1.94	9.96
					(acre)	(acre)	(acre)	(acre)	(acre)	(acre)	(acre)	(acre)
Machine Shed and Shop	1	NA	50	28,000	10.84	37.94 <sup>b/</sup>	5.50	55.28	0.0	0.0	0.0	55.28
Irrigation System	1	NA	25	55,800	48.00	67.20 <sup>c/</sup>	1.88	117.08	15.00	21.60 <sup>d/</sup>	36.60	153.68
Shop Tools	NA	NA	5	2,000	8.60	3.01	0.52	12.13	0.0	0.0	0.0	12.13
Pruning Tools	6	NA	3	100	0.73	0.16	0.0	0.89	0.0	0.0	0.0	0.89
Picking Sack	30	NA	5	21	0.09	0.03	0.0	0.12	0.0	0.0	0.0	0.12
Ladders	15	NA	10	80	0.17	0.12	0.02	0.31	0.0	0.0	0.0	0.31

<sup>a/</sup> Fourteen percent opportunity cost. This is earnings foregone from alternative investments and/or interest paid on money borrowed to finance capital purchases.

<sup>b/</sup> By year 6, the machine shed and shop has been depreciated to a value of \$25,200. Interest is calculated on the average value (\$12,600) over its remaining 45-year life.

<sup>c/</sup> By year 6, the irrigation system has been depreciated to a value of \$960 per acre. Interest is calculated on the average value (\$480) over its remaining 20-year life.

<sup>d/</sup> Electricity and lube.



Table 6. Summary of Receipts, Costs, and Profitability per Acre for a Mature Red Delicious Apple Orchard in the Columbia Basin of Central Washington.

	Unit	Price or Cost/Unit \$	Quantity	Value or Cost \$	Your Farm \$
Gross Receipts from Production					
Red Delicious Apples	Bins	\$100.00	54.0	5,400.00	_____
1. Total Receipts				5,400.00	_____
Less: Total Variable Cost				2,927.76	_____
2. Returns Over Variable Cost				2,472.24	_____
Less: Machinery, Irrigation, & Building Fixed Cost				471.82	_____
Amortized Estab. Cost				1,353.29	_____
3. Gross Returns to Land and Management				647.13	_____
Less: Real Estate Taxes				47.00	_____
4. Net Returns to Land and Management				600.13	_____

Table 7. Break-Even Return per Bin to the Apple Grower.

	Cost per Acre <sup>*/</sup> \$	Your Farm	Break-Even <sup>**/</sup> Return/Bin \$	Your Farm
1. Total Variable Costs	2,927.76	_____	54.22	_____
Plus: Ins. & Taxes on Mach., Bldg. & Irrig.	28.59	_____		
Land Taxes	47.00	_____		
	_____	_____		
	_____	_____		
2. Total Cash Costs	3,003.35	_____	55.62	_____
Plus: Depr. on Mach., Bldg. & Irrig.	200.10	_____		
3. Total Cash Costs + Depr.	3,203.45	_____	59.32	_____
Plus: Int. on Mach., Bldg. & Irrig.	243.13	_____		
Net Land Rent	110.00	_____		
Amort. Estab. Cost	1,353.29	_____		
4. Total Cost	4,909.87	_____	90.92	_____

<sup>\*/</sup> Excluding storage, packaging, and marketing costs.

<sup>\*\*/</sup> Assumes 54 bins per acre production level.

Table 8. Per-Acre Returns to Land and Management for Varying Yields and Prices.<sup>\*/</sup>

Yield/Price	\$70 per Bin <sup>**/</sup>	\$80 per Bin <sup>**/</sup>	\$90 per Bin <sup>**/</sup>	\$100 per Bin <sup>**/</sup>	\$110 per Bin <sup>**/</sup>
BINS	\$	\$	\$	\$	\$
42	-1,742	-1,322	-902	-482	- 62
48	-1,436	- 956	-476	4	484
54	-1,020	- 480	60	600	1,140
60	- 824	- 224	376	976	1,576

<sup>\*/</sup> Assumes establishment cost as published in EB 0960 (revised), "1985 Cost of Establishing an Apple Orchard, Columbia Basin, Washington."

<sup>\*\*/</sup> Returns received by the producer after paying storage, packaging, and marketing cost.

Table 9. 1985 Prices for Selected Inputs.

Item	Unit	Price \$
Fertilizers:		
Nitrogen	Lb.	.35
Solubor	Lb.	.66
Organophosphorus	Pt.	3.16
Zinc Chelate	Gal.	4.32
Herbicides:		
2,4-D	Qt.	3.73
X-77	Qt.	3.76
Sinbar	Lb.	18.91
Paraquat	Qt.	12.00
Karmex	Lb.	.66
Insecticides:		
Thiodan	Lb.	4.38
Thiodan	Qt.	7.50
Superior Oil	Gal.	2.85
Guthion	Lb.	5.44
Systox	Pt.	4.20
Fungicide	Pt.	6.67
Miticide	Lb.	20.79
Rodenticides:		
Rozol	Lb.	1.17
Strychnine Oats	Lb.	1.15
Growth Regulators:		
Elgetol	Pt.	3.59
NAA	Oz.	.09
Sevin	Lb.	2.10
Machine Rental:		
35 HP Tractor with Backfork	Hr.	6.35
Other:		
Aerial Spraying	Acre	6.00
Fuel	Gal.	1.17
Custom Hauling and Bin Rental	Bin	3.00
Bin Rental	Bin	2.50
Labor	Hr.	6.30
Harvest Supervisor	Bin	.50
Pickers	Bin	9.00