



CooperativeExtension

College of Agriculture
Washington State University
Pullman, Washington

EXTENSION BULLETIN 1312
JANUARY 1985

**Cost of Establishing
A Jonagold or Gala
Apple Orchard
In 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 and well managed central Washington apple orchard as of 1984. To avoid drawing unwarranted conclusions about costs and returns for any particular farm or group of farms, the reader must closely examine the assumptions used in this publication. If they are not appropriate for the situation at hand, adjustments in the costs and/or returns should be made.

COST OF ESTABLISHING A JONAGOLD OR GALA
APPLE ORCHARD IN CENTRAL WASHINGTON

A. Brooke Peterson and Herbert R. Hinman^{*/}

INTRODUCTION

Apple production in central part of Washington has increased dramatically over the last 20 years. In 1964, there were approximately 83,000 acres of apples in central Washington.^{1/} By 1978, apple acreage had grown to approximately 111,470 acres. In 1982, apple acreage was estimated to be 145,630 acres.^{2/} The variety make-up during this time has been dominated by the Delicious strain, which made up 72% of all apples shipped from central Washington during 1982-83.^{3/}

Although the Delicious strain has dominated production over the last 20 years, there has recently been significant interest in producing, on a commercial basis, Jonagold and Gala apples. These varieties are of excellent dessert quality and are grown extensively in other major apple-producing regions around the world. They are non-spur varieties with a more vigorous growth habit than the popular strains of Delicious. In addition, Jonagold and Gala are grown on a dwarfing rootstock (M26), which permits a closer planting pattern than generally afforded the Delicious strains.

The objective of this study is to present estimated costs of establishing a Jonagold or Gala orchard in central Washington. Growers, prospective growers, agricultural lenders, and others concerned with the Washington apple industry should find the information helpful in estimating the physical and financial requirements of establishing plantings of Jonagold or Gala apples. While the acreages and practices outlined may not fit all conditions, they represent current trends. The study is of particular interest where new lands are being opened for plantings.

^{*/} Yakima County Horticulture Agent and Extension Economist, Cooperative Extension, Washington State University, respectively.

^{1/} Tukey, Ronald. "Data Related to Washington Apple Production and Utilization," EM 3282, Cooperative Extension, Washington State University, 1969.

^{2/} "1982 Census of Agriculture-Preliminary Report," U. S. Department of Commerce, Washington, DC.

^{3/} Yakima Valley Growers-Shippers Association Annual Report, Yakima, Washington, 1983.

BUDGET ASSUMPTIONS

The practices outlined in this publication represent the latest development in orchard design and planting on new orchard ground. The assumptions used in developing this information are:

1. The orchard area is 100 acres. However, some land is needed for roads, windbreaks, buildings, etc. Therefore, for this study, 93% of the land was actually planted to apple trees.
2. Trees are non-spur varieties on dwarfing rootstock. The trees are supported by stakes and trained to a central form using the stake as a training aid.
3. Tree spacing is 6.5 feet x 16 feet with pollenizer trees interset every twelfth tree in every row. This spacing results in about 419 main variety trees plus 35 pollenizer trees, making a total of 454 trees per acre.
4. An under-tree, solid-set permanent irrigation system is used.
5. New purchase costs (1984) are used for all machinery, equipment, and buildings. While this assumption may overstate apple production costs currently being experienced, it indicates the earnings needed to replace depreciable assets. Recent increases in machinery and equipment prices mean that the depreciation claimed on assets purchased earlier substantially understates the amount of capital now needed for asset replacement. When an enterprise is evaluated for long-run profitability, it is important to consider its ability to replace depreciable assets on a new cost basis.

These assumptions require careful study and consideration. Whether this is a new operation or an addition to an existing orchard, the establishment of 100 acres of new plantings requires additional labor, equipment, machinery, and buildings. In planting new land rather than old orchard soils, better tree growth and perhaps earlier production would be likely.

Selection of cultivars and rootstocks will alter tree spacing and per-acre populations as well as growth and productivity. Although two different varieties were used in this study, we assumed that for the five-year establishment period and under the conditions outlined, yields and returns would be similar. Under actual conditions, both yield and prices for different varieties would likely vary. Note that both varieties in this publication are non-spur varieties planted 419 trees to the acre using a support system.

The irrigation system assumes soil readily adaptable to the use of plastic pipe. Similarly, planting assumes a soil suitable to the use of a tree planter.

SOURCES OF INFORMATION

Most information for this study was obtained from experienced Washington fruit growers, some of whom had made plantings of Jonagold or Gala. This, plus information from other tree fruit areas in the United States and Canada relating to the specific varieties and training system provided the base for current planting practices and requirements for labor, equipment, and supplies. Several central Washington suppliers provided current prices on machinery, equipment, custom operations, fertilizer, chemicals, and power. The land prices and property tax used represent current prices for orchard land.

Due to the process used, the data should be viewed as representative of a 100-acre orchard rather than as a mathematical average of a large number of producers. Where such factors as orchard size, machinery complement, machinery use, cultural practices, and input prices differ from those assumed in this publication, quite different establishment costs may result. Moreover, this publication is not specifically intended as a guide to planting practices. Rather, it represents the current technology that could be used with the planting of non-spur type apple varieties.

SUMMARY OF CAPITAL INVESTMENT AND ESTABLISHMENT COSTS

Table 1 presents the estimated annual capital requirements for new equipment, buildings, land, and operating expenses when establishing a 100-acre Jonagold or Gala apple orchard in central Washington. While most of the field equipment, buildings, and vehicles may be on hand before planting the orchard, all assets used in developing the orchard are included for the sake of completeness. It is assumed that all items are purchased the year they are used. Of course, the actual timing of the capital outlays will vary depending on how the various assets are financed.

Table 1: Capital Requirements per Year for Equipment, Buildings, Land, and Operating Expenses for the Five-Year Establishment Period of a 100-Acre Jonagold or Gala Apple Orchard in Central Washington.^{a/}

| | Year | Year | Year | Year | Year |
|--|---------|--------|--------|---------|---------|
| | 1 | 2 | 3 | 4 | 5 |
| | \$ | \$ | \$ | \$ | \$ |
| Requirements: | | | | | |
| Land (100 acres) | 230,000 | | | | |
| Irrigation system (93 acres) | 93,000 | | | | |
| Machine shed and shop | 50,000 | | | | |
| Equipment | 47,140 | 1,282 | 21,084 | 11,946 | 11,835 |
| Operating expenses ^{b/} (93 acres) | 405,407 | 75,306 | 59,540 | 102,219 | 117,546 |
| Land and irrig. tax (100 acres) | 4,000 | 6,200 | 6,200 | 6,200 | 8,000 |
| Total | 829,547 | 82,788 | 86,824 | 120,365 | 137,381 |

Table 1, continued.

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---------------------|-----------|-----------|-----------|-----------|-----------|
| | \$ | \$ | \$ | \$ | \$ |
| Receipts: Apples | | | | 93,000 | 186,000 |
| Net Requirements: | 829,547 | 82,788 | 86,824 | 27,365 | (48,619) |

a/ Cost based on establishing a 100-acre orchard with 93% of the total area planted to trees. Costs do not include interest on loans or establishment costs.

b/ Includes per year variable costs and insurance and taxes on equipment, buildings, and the irrigation system.

Annual costs per acre for the five-year development period are summarized in Table 2. Total cost of establishing the orchard, minus revenues from sale of partial crops in years 4 and 5, is approximately \$12,350 per acre. These costs represent annual operating expenses and, unlike the capital requirements in Table 1, they include amortized expenses for capital assets with a useful life in excess of one year.

Table 2: Five-Year Establishment Cost per Planted Acre for Jonagold or Gala Apple Orchard in Central Washington.

| Establishment Year | Yearly Costs \$ | Yearly Revenue ^{a/} \$ | Net Yearly Estab. Cost \$ | Accumulated Estab. Cost \$ |
|-----------------------|-----------------------|---------------------------------------|---------------------------------|----------------------------------|
| 1 | 4,864.36 | - | 4,864.36 | 4,864.36 |
| 2 | 2,009.85 | 0 | 2,009.85 | 6,874.21 |
| 3 | 2,122.69 | 0 | 2,122.69 | 8,996.90 |
| 4 | 2,930.26 | 1,000.00 | 1,930.26 | 10,927.16 |
| 5 | 3,422.51 | 2,000.00 | 1,422.51 | 12,349.67 |

a/ Revenues in year 4 are estimated to be 10 bins at a sale price of \$100 per bin. Revenues in year 5 are estimated to be 20 bins at a sale price of \$100 per bin.

ANNUAL COSTS DURING ESTABLISHMENT

Estimated costs for each year are shown in two tables (an A and B table, see Tables 3A through 7B). Tables 3A through 7A outline the schedule of field operations by calendar month, the type of equipment and labor used, and the hours used per acre for the apple orchard for each of the establishment years.

The costs of field operations are divided into two categories. The first is fixed costs--equipment, irrigation, building and land ownership. The second category, variable costs, is associated with operating equipment, hiring labor, and purchasing services and materials. Total cost is the sum of fixed costs 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 and shop, and some miscellaneous equipment are determined on a per-acre basis by dividing the total annual fixed cost by the number of acres. The per-hour (acre) fixed and variable costs for all equipment and buildings are presented in Table 8.

Land fixed cost is equal to net rent, and is based on rental rates typical of bare land minus annual property taxes and any other expenditures typically covered by the landlord. While the owner-operator obviously will not experience land rental cost, the cost represents the minimum return the owner-operator must have to justify growing this crop on the land himself. Net rent represents the income the owner-operator foregoes by using the land to produce the crop himself rather than renting it to a tenant. As a result of investing his capital in land, the farmer receives both current returns from crop production and any long-term land value appreciation. However, the farmer would continue to receive land value appreciation even if he rented the land out. Consequently, the appropriate land charge is only the net rent lost. As used in this publication, the land cost is termed an opportunity cost. This indicates that it is not an out-of-pocket expense, but rather a return that is foregone by the producer by growing the crop himself. Of course, for the individual producer, cash costs such as interest payments on loans used to buy land must be identified and treated as cash costs, not as opportunity 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. Machinery operating labor is also included as a variable cost.

The second set of tables (Tables 3B through 7B) presents summaries of costs appearing in Tables 3A through 7A. Most items are self-explanatory. However, "Machinery Interest" and "Irrigation Interest" warrant additional explanation. These figures represent opportunity cost (returns foregone by investing in the given equipment and irrigation complement rather than in alternative investments) or interest paid to finance the given equipment and irrigation complement. Total interest cost on these capital purchases is calculated on the average value of the machinery and irrigation system over their respective years of use. The 14% interest charge made against this "average" value represents the total interest cost.

First Year

It was assumed that the land was not previously used for crop production. Prior vegetation consisted of typical central Washington vegetation, namely upland desert grasses and sagebrush. Land preparation costs can be highly variable, depending on the particular site. For this study, it was assumed that \$125.00 per acre would be spent in readying the land for planting. In addition, \$5.00 per acre would be spent for a soil fertility analysis from a commercial laboratory.

Table 3A outlines the schedule of field operations by calendar month, the type of machinery and labor used, and the hours used per acre during the first year of establishment. Table 3B presents a summary of per-acre costs, totaling \$4,864.36, experienced during the first year.

Second Year

The loss of newly planted trees is generally very minimal. In this study, it was assumed that for every four acres, one main variety tree was lost and had to be replanted in the second year. In addition, pollenizer trees are interspersed every twelfth tree in every row totaling 35 pollenizer trees per fully planted acre.

Note that beginning in the second year, interest of 14% is charged against the net amount invested per acre in establishing the orchard. This represents interest actually paid on money borrowed and/or interest that could have been earned in an alternative investment. Second-year establishment costs totaled \$2,009.85 per acre.

Third Year

Pruning and training costs increase due to larger trees and the addition of more limb spreaders to the training operation. Some trees develop fruit in the third year but most growers remove that fruit by hand in order to develop a better tree. In the third year, most producers begin spraying to prevent mildew. Third-year establishment costs totaled \$2,122.69 per acre.

Fourth Year

Orchardists normally harvest a light crop from semi-dwarf apple trees that are four years old. In this study, it was assumed that 10 bins of apples were harvested and sold for \$100 per bin. With such a light crop, bins are typically not distributed within the field but loaded on a backfork that follows the pickers through the field.

Due to the production of fruit in the fourth year, central Washington growers usually begin spraying for the control of insects in the fourth year. Table 6A shows application of two delayed dormant sprays and one cover spray along with the other field operations. Fourth-year establishment costs totaled \$2,930.26 per acre. However, because of the \$1,000.00 crop value, the net annual cost per acre was \$1,930.26, as shown in Table 2.

Fifth Year

When the planting is in the fifth year, orchardists generally can expect to obtain approximately 20 bins of apples per acre from semi-dwarf trees at this spacing. As the trees start to produce more fruit, less emphasis is on tree training and more on pruning, controlling tree growth, and controlling orchard pests. Thinning spray rather than hand labor is used to thin the fruit during the fifth year. Also, a system of bin distribution, swamping and cleanup, plus some formal harvest supervision must be established at harvest time. Fifth-year establishment costs total \$3,422.51 per acre. However, because of the \$2,000.00 crop value, the annual net cost per acre is \$1,422.51, as shown in Table 2.

EQUIPMENT, BUILDING, AND INPUT COSTS

Table 8 gives the equipment and building complement used to derive the cost estimates, including 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, fuel and lubrication costs, costs that vary with the crop grown or the number of acres produced.

Table 9 indicates the prices for fuel, fertilizer, chemicals, tree stock, and other selected inputs used in deriving these budgets.

CONCLUDING NOTE

The estimates in this publication rest on many assumptions. In planting 100 acres of ground, the dimensions of the field, topography, and the need for roads reduces the number of actual acres of orchard. The need for windbreaks, buildings, and service areas may reduce the area even further.

Also, it was assumed that the land, irrigation system, machinery, equipment, and buildings would be purchased. No consideration was given to housing.

The authors recognized that the situation outlined is not characteristic of all orchard or farm operations. For example, many economies can be gained by adding this acreage onto existing farm operations. Conversely, added costs can be anticipated when the planting represents a separate business enterprise. This publication should be used merely as a guide; considerable judgment must be exercised in generalizing cost estimates to situations differing from those outlined above.

TABLE 3A: FIRST YEAR SCHEDULE OF OPERATIONS AND COSTS PER ACRE OF ESTABLISHING
A JONAGOLD OR GALA APPLE ORCHARD IN CENTRAL WASHINGTON. *

| | | VARIABLE COST | | | | | | | | | |
|-----------------|-------------------------------|---------------|-------|----------------|---------------|------------------------|-------|--------|----------------------|---------------------------|---------------|
| OPERATION | TOOLING | MONTH | HOURS | LABOR HOURS | FIXED COST | FUEL,OIL, LUBE,AND, | | | SERVICE MATERIALS | TOTAL VARIABLE COST | TOTAL COST |
| | | | | | | REPAIRS | LABOR | | | | |
| | | | | | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| FIELD PREP.** | CUSTOM HIRE | DEC-MAR | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 125.00 | 0.0 | 125.00 | 125.00 |
| SOIL ANALYSIS | PREPLANT | FEB | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.00 | 0.0 | 5.00 | 5.00 |
| FERTILIZE | 50HP-WT., FERT. SPR. BDCT. | FEB | 0.25 | 0.30 | 2.29 | 2.20 | 1.50 | 0.0 | 51.67 | 55.37 | 57.67 |
| LAYOUT & STAKE | HAND LABOR | FEB | 0.0 | 3.00 | 0.0 | 0.0 | 15.00 | 0.0 | 4.00 | 19.00 | 19.00 |
| PLANT | RENTED 110HP-WT W/PLANTER | MAR | 0.0 | 1.50 | 0.0 | 6.50 | 7.50 | 22.50 | 2095.00 | 2131.50 | 2131.50 |
| PLANTING LABOR | HAND LABOR | MAR | 0.0 | 6.25 | 0.0 | 0.0 | 31.25 | 0.0 | 0.0 | 31.25 | 31.25 |
| HAUL PLANTS | 50HP-WT, TRAILER | MAR | 1.30 | 1.56 | 8.42 | 9.03 | 7.80 | 0.0 | 0.0 | 16.83 | 25.25 |
| IRRIGATE | SOLID SET, 28AC.IN. | APR-OCT | 0.0 | 4.20 | 174.25 | 30.24 | 21.00 | 50.00 | 0.0 | 101.24 | 275.49 |
| IRRIGATE | 4-WHEEL SCOOTER | APR-OCT | 1.00 | 0.0 | 2.03 | 2.08 | 0.0 | 0.0 | 0.0 | 2.08 | 4.11 |
| FERTILIZE | 50HP-WT, FERT. SPR. BDCT. | APR | 0.25 | 0.30 | 2.29 | 2.20 | 1.50 | 0.0 | 18.45 | 22.15 | 24.45 |
| HERB. APPLIC. | 50HP-WT, WEED SPRAYER | MAY | 1.00 | 1.20 | 6.45 | 7.76 | 6.00 | 0.0 | 57.20 | 70.96 | 77.40 |
| MOW WEEDS | 50HP-WT, 8' MOWER | MAY | 0.50 | 0.60 | 3.74 | 4.19 | 3.00 | 0.0 | 0.0 | 7.18 | 10.93 |
| PRUNE | HAND LABOR, PRUNING TOOLS | MAY | 0.0 | 6.50 | 0.63 | 0.0 | 32.50 | 0.0 | 0.0 | 32.50 | 33.13 |
| PLACE TR. POLES | 50HP-WT., RENTED POLE DRIVER | JUNE | 3.00 | 14.30 | 14.17 | 20.05 | 71.50 | 4.50 | 345.68 | 441.73 | 455.90 |
| PLACE TR. POLES | RENTED 40HP-WT. & POLE DRIVER | JUNE | 0.0 | 14.30 | 0.0 | 9.75 | 71.50 | 19.50 | 345.67 | 446.42 | 446.42 |
| HAUL TREE POLES | PICKUP | JUNE | 3.00 | 3.60 | 16.15 | 10.14 | 18.00 | 0.0 | 0.0 | 28.14 | 44.29 |
| PAINT TRUNKS | HAND LABOR | JUNE | 0.0 | 5.40 | 0.0 | 0.0 | 27.00 | 0.0 | 55.20 | 82.20 | 82.20 |
| SEED GRASS | 50HP-WT., RENTED SEEDER | JUNE | 0.50 | 0.60 | 2.36 | 3.34 | 3.00 | 10.00 | 15.00 | 31.34 | 33.70 |
| FERTILIZE | HAND LABOR (AFTER 3D IRR.) | JUNE | 0.0 | 0.40 | 0.0 | 0.0 | 2.00 | 0.0 | 11.07 | 13.07 | 13.07 |
| MOW WEEDS | 50HP-WT, 8' MOWER | JULY | 0.50 | 0.60 | 3.74 | 4.19 | 3.00 | 0.0 | 0.0 | 7.18 | 10.93 |
| HERB. APPLIC. | 50HP-WT., WEED SPRAYER | JULY | 1.00 | 1.20 | 6.45 | 7.76 | 6.00 | 0.0 | 12.00 | 25.76 | 32.20 |
| APHID CONTROL | CUSTOM AERIAL | JULY | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.50 | 9.36 | 14.86 | 14.86 |
| MOW WEEDS | 50HP-WT, 8' MOWER | OCT | 0.50 | 0.60 | 3.74 | 4.19 | 3.00 | 0.0 | 0.0 | 7.18 | 10.93 |
| FERTILIZE | 50HP-WT, FERT. SPREADER | NOV | 0.25 | 0.30 | 2.29 | 2.20 | 1.50 | 0.0 | 18.45 | 22.15 | 24.45 |
| MOUSE CONTROL | CUSTOM AERIAL | NOV | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.50 | 10.70 | 15.20 | 15.20 |

TABLE 3A: Continued

| OPERATION | TOOLING | MONTH | LABOR HOURS | LABOR HOURS | VARIABLE COST | | | | | TOTAL VARIABLE COST | TOTAL COST |
|-----------------------|----------------------------|--------|----------------|----------------|---------------|-----------------------------------|--------|---------|-----------|---------------------------|---------------|
| | | | | | FIXED COST | FUEL,OIL, LUBE,AND, REPAIRS | LABOR | SERVICE | MATERIALS | | |
| | | | | | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| MISC-USE | 4-WHEEL SCOOTER | ANNUAL | 0.50 | 0.60 | 1.01 | 1.04 | 3.00 | 0.0 | 0.0 | 4.04 | 5.05 |
| MISC USE | 1/2 TON PICK-UP | ANNUAL | 3.00 | 3.60 | 16.15 | 10.14 | 18.00 | 0.0 | 0.0 | 28.14 | 44.29 |
| MISC USE | 50HP-WT, TRAILER | ANNUAL | 0.50 | 0.60 | 3.24 | 3.47 | 3.00 | 0.0 | 0.0 | 6.47 | 9.71 |
| MISC USE | SHOP TOOLS | ANNUAL | 0.0 | 0.0 | 12.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 12.13 |
| BUILDING | MACHINE SHED AND SHOP | ANNUAL | 0.0 | 0.0 | 88.72 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 88.72 |
| INTEREST | OPERATING CAPITAL | ANNUAL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 343.30 | 0.0 | 343.30 | 343.30 |
| OVERHEAD | UTILITIES,LEGAL,ACCT.,ETC. | ANNUAL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 206.87 | 0.0 | 206.87 | 206.87 |
| TAXES | LAND & IRRIGATION | ANNUAL | 0.0 | 0.0 | 40.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 40.00 |
| LAND COST | NET RENT | ANNUAL | 0.0 | 0.0 | 110.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 110.00 |
| TOTAL PER ACRE | | | 17.05 | 71.51 | 520.26 | 140.43 | 357.55 | 796.67 | 3049.45 | 4344.10 | 4864.36 |

*COST BASED ON ESTABLISHING A 100 ACRE ORCHARD WITH 93% OF THE
TOTAL AREA PLANTED TO TREES.

**DISC, HARROW & MOVE ROCKS.

TABLE 3B: SUMMARY OF FIRST YEAR PER ACRE COSTS FOR ESTABLISHING A JONAGOLD OR GALA APPLE ORCHARD IN CENTRAL WASHINGTON.

| | UNIT | PRICE OR COST/UNIT | QUANTITY | VALUE OR COST | YOUR FARM |
|--------------------------------|------|-----------------------|----------|------------------|--------------|
| VARIABLE COSTS | | | | | |
| PAIN | TREE | 6.00 | 9.20 | \$ 55.20 | _____ |
| COMPANION SEED | LBS. | 1.50 | 10.00 | 15.00 | _____ |
| DINITRO | TREE | 10.50 | 1.00 | 10.50 | _____ |
| DIESEL OIL | TREE | 1.50 | 1.00 | 1.50 | _____ |
| THIODAN | LBS. | 4.68 | 2.00 | 9.36 | _____ |
| NITROGEN | LBS. | 0.369 | 130.00 | 47.97 | _____ |
| STAKES | ACRE | 4.00 | 1.00 | 4.00 | _____ |
| TREES | TREE | 5.00 | 419.00 | 2095.00 | _____ |
| SURFLAN | LBS. | 11.44 | 5.00 | 57.20 | _____ |
| ROZOL | LBS. | 1.07 | 10.00 | 10.70 | _____ |
| TREE POLES | POLE | 1.65 | 419.00 | 691.35 | _____ |
| PRE-PLANT FERT. | ACRE | 51.67 | 1.00 | 51.67 | _____ |
| IRRIG. CHARGE | ACRE | 50.00 | 1.00 | 50.00 | _____ |
| CUSTOM AERIAL | ACRE | 5.50 | 1.00 | 5.50 | _____ |
| CUSTOM AERIAL | ACRE | 4.50 | 1.00 | 4.50 | _____ |
| SOIL ANALYSIS | ACRE | 5.00 | 1.00 | 5.00 | _____ |
| FIELD PREPARATION | ACRE | 125.00 | 1.00 | 125.00 | _____ |
| SEEDER (RENTAL) | ACRE | 10.00 | 1.00 | 10.00 | _____ |
| 40 H.P. TRACTOR (RENTAL) | HR. | 5.00 | 3.00 | 15.00 | _____ |
| 110 HP-WT., W/PLANTER (RENTAL) | ACRE | 22.50 | 1.00 | 22.50 | _____ |
| POLE DRIVER (RENTAL) | ACRE | 4.50 | 2.00 | 9.00 | _____ |
| MACHINERY REPAIR | ACRE | 38.66 | 1.00 | 38.66 | _____ |
| MACHINERY FUEL | ACRE | 64.32 | 1.00 | 64.32 | _____ |
| MACHINERY LUBE | ACRE | 7.21 | 1.00 | 7.21 | _____ |
| IRRIGATION REPAIR | ACRE | 14.00 | 1.00 | 14.00 | _____ |
| IRRIGATION FUEL | ACRE | 14.84 | 1.00 | 14.84 | _____ |
| IRRIGATION LUBE | ACRE | 1.40 | 1.00 | 1.40 | _____ |
| LABOR (MACHINERY) | HR. | 5.00 | 24.36 | 121.80 | _____ |
| LABOR (IRRIGATION) | HR. | 5.00 | 4.20 | 21.00 | _____ |
| HAND LABOR | HR. | 5.00 | 42.95 | 214.75 | _____ |
| INTEREST ON OP. CAP. | DOL. | 0.14 | 2452.16 | 343.30 | _____ |
| OVERHEAD COST | DOL. | 0.05 | 4137.23 | 206.87 | _____ |
| TOTAL VARIABLE COST | | | | \$4344.10 | _____ |
| FIXED COSTS | | | | | |
| MACHINERY DEPRECIATION* | ACRE | 63.40 | 1.00 | \$ 63.40 | _____ |
| MACHINERY INTEREST* | ACRE | 119.25 | 1.00 | 119.25 | _____ |
| MACHINERY INSURANCE* | ACRE | 3.66 | 1.00 | 3.66 | _____ |
| MACHINERY TAXES* | ACRE | 9.70 | 1.00 | 9.70 | _____ |
| IRRIGATION DEPRECIATION | ACRE | 50.00 | 1.00 | 50.00 | _____ |
| IRRIGATION INTEREST | ACRE | 122.50 | 1.00 | 122.50 | _____ |
| IRRIGATION INSURANCE | ACRE | 1.75 | 1.00 | 1.75 | _____ |
| TAXES (LAND & IRRIGATION) | ACRE | 40.00 | 1.00 | 40.00 | _____ |
| LAND (NET RENT) | ACRE | 1.00 | 110.00 | 110.00 | _____ |
| TOTAL FIXED COSTS | | | | \$ 520.26 | _____ |
| TOTAL COSTS | | | | \$4864.36 | _____ |

* INCLUDES MACHINE SHED AND SHOP.

TABLE 4A: SECOND YEAR SCHEDULE OF OPERATIONS AND COSTS PER ACRE OF ESTABLISHING
A JONAGOLD OR GALA APPLE ORCHARD IN CENTRAL WASHINGTON.*

| OPERATION | TOOLING | MONTH | HOURS | LABOR HOURS | VARIABLE COST | | | | | TOTAL VARIABLE COST | TOTAL COST |
|------------------|----------------------------|---------|-------|----------------|---------------|---------------|-----------------------------------|--------|---------|---------------------------|---------------|
| | | | | | LABOR COST | FIXED COST | FUEL,OIL, LUBE,AND, REPAIRS | LABOR | SERVICE | | |
| | | | | \$ | \$ | \$ | \$ | \$ | \$ | \$ | |
| PRUNE | HAND LABOR, PRUNING TOOLS | DEC-MAR | 0.0 | 7.80 | 0.63 | 0.0 | 39.00 | 0.0 | 60.00 | 99.00 | 99.63 |
| PLT. POLLINIZERS | 50HP-WT, 24" TREE AUGER | MAR | 1.88 | 4.52 | 11.62 | 15.04 | 22.60 | 0.0 | 175.00 | 212.64 | 224.26 |
| HAUL PLANTS | 1/2 TON PICKUP | MAR | 1.88 | 2.26 | 10.12 | 6.35 | 11.28 | 0.0 | 0.0 | 17.63 | 27.75 |
| IRRIGATE | SOLID SET, 24AC.IN. | APR-OCT | 0.0 | 4.20 | 174.25 | 25.92 | 21.00 | 50.00 | 0.0 | 96.92 | 271.17 |
| IRRIGATE | 4-WHEEL SCOOTER | APR-OCT | 1.00 | 0.0 | 2.03 | 2.08 | 0.0 | 0.0 | 0.0 | 2.08 | 4.11 |
| HERB. APPLIC. | 50HP-WT, WEED SPRAYER | MAY | 1.00 | 1.20 | 6.45 | 7.76 | 6.00 | 0.0 | 57.20 | 70.96 | 77.40 |
| MOW WEEDS | 50HP-WT, 8' MOWER | MAY | 0.50 | 0.60 | 3.74 | 4.19 | 3.00 | 0.0 | 0.0 | 7.18 | 10.93 |
| MOW WEEDS | 50HP-WT, 8' MOWER | JULY | 0.50 | 0.60 | 3.74 | 4.19 | 3.00 | 0.0 | 0.0 | 7.18 | 10.93 |
| HERB. APPLIC. | 50HP-WT, WEED SPRAYER | JULY | 1.00 | 1.20 | 6.45 | 7.76 | 6.00 | 0.0 | 6.00 | 19.76 | 26.20 |
| APHID CONTROL | CUSTOM AERIAL | JULY | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.50 | 9.36 | 14.86 | 14.86 |
| HERB.APPLIC. | 50HP-WT.,WEED SPRAYER | JULY | 1.00 | 1.20 | 6.45 | 7.76 | 6.00 | 0.0 | 12.00 | 25.76 | 32.20 |
| MOW WEEDS | 50HP-WT, 8' MOWER | OCT | 0.50 | 0.60 | 3.74 | 4.19 | 3.00 | 0.0 | 0.0 | 7.18 | 10.93 |
| FERTILIZE | 50HP-WT, FERT. SPREADER | NOV | 0.25 | 0.30 | 2.29 | 2.20 | 1.50 | 0.0 | 46.13 | 49.83 | 52.12 |
| GOPHER CONTROL | 50HP-WT, GOPHER MACHINE | NOV | 0.25 | 0.30 | 2.73 | 2.13 | 1.50 | 0.0 | 7.35 | 10.98 | 13.71 |
| MOUSE CONTROL | CUSTOM AERIAL | NOV | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.50 | 10.70 | 15.20 | 15.20 |
| MISC-USE | 4-WHEEL SCOOTER | ANNUAL | 0.50 | 0.60 | 1.01 | 1.04 | 3.00 | 0.0 | 0.0 | 4.04 | 5.05 |
| MISC USE | 1/2 TON PICK-UP | ANNUAL | 4.12 | 4.94 | 22.18 | 13.92 | 24.72 | 0.0 | 0.0 | 38.64 | 60.82 |
| MISC USE | 50HP-WT, TRAILER | ANNUAL | 0.50 | 0.60 | 3.24 | 3.47 | 3.00 | 0.0 | 0.0 | 6.47 | 9.71 |
| MISC USE | SHOP TOOLS | ANNUAL | 0.0 | 0.0 | 12.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 12.13 |
| BUILDING | MACHINE SHED AND SHOP | ANNUAL | 0.0 | 0.0 | 88.72 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 88.72 |
| INTEREST | OPERATING EXPENSE | ANNUAL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 51.13 | 0.0 | 51.13 | 51.13 |
| OVERHEAD | UTILITIES,LEGAL,ACCT.,ETC. | ANNUAL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 37.87 | 0.0 | 37.87 | 37.87 |
| TAXES | LAND & IRRIGATION | ANNUAL | 0.0 | 0.0 | 62.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 62.00 |
| 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 | 681.01 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 681.01 |
| TOTAL PER ACRE | | | 14.88 | 30.92 | 1214.54 | 107.98 | 154.60 | 149.00 | 383.73 | 795.31 | 2009.85 |

*COST BASED ON ESTABLISHING A 100 ACRE ORCHARD WITH 93% OF THE
TOTAL AREA PLANTED TO TREES.

TABLE 4B: SUMMARY OF SECOND YEAR PER ACRE COSTS OF ESTABLISHING A JONAGOLD OR GALA APPLE ORCHARD IN CENTRAL WASHINGTON.

| | UNIT | PRICE OR COST/UNIT | QUANTITY | VALUE OR COST | YOUR FARM |
|---------------------------|------|--------------------|----------|---------------|-----------|
| VARIABLE COSTS | | | | | |
| THIODAN | LBS. | 4.68 | 2.00 | \$ 9.36 | _____ |
| TREES | TREE | 5.00 | 35.00 | 175.00 | _____ |
| SPREADERS | ACRE | 60.00 | 1.00 | 60.00 | _____ |
| PARAQUAT | ACRE | 6.00 | 1.00 | 6.00 | _____ |
| SURFLAN | LBS. | 11.44 | 5.00 | 57.20 | _____ |
| NITROGEN | LBS. | 0.369 | 125.00 | 46.13 | _____ |
| STRYCHNINE OATS | LBS. | 1.05 | 7.00 | 7.35 | _____ |
| ROZOL | LBS. | 1.07 | 10.00 | 10.70 | _____ |
| IRRIG. CHARGE | ACRE | 50.00 | 1.00 | 50.00 | _____ |
| DINITRO | TREE | 10.50 | 1.00 | 10.50 | _____ |
| DIESEL OIL | TREE | 1.50 | 1.00 | 1.50 | _____ |
| CUSTOM AERIAL | ACRE | 4.50 | 1.00 | 4.50 | _____ |
| CUSTOM AERIAL | ACRE | 5.50 | 1.00 | 5.50 | _____ |
| MACHINERY REPAIR | ACRE | 38.26 | 1.00 | 38.26 | _____ |
| MACHINERY FUEL | ACRE | 38.08 | 1.00 | 38.08 | _____ |
| MACHINERY LUBE | ACRE | 5.71 | 1.00 | 5.71 | _____ |
| IRRIGATION REPAIR | ACRE | 12.00 | 1.00 | 12.00 | _____ |
| IRRIGATION FUEL | ACRE | 12.72 | 1.00 | 12.72 | _____ |
| IRRIGATION LUBE | ACRE | 1.20 | 1.00 | 1.20 | _____ |
| LABOR (MACHINERY) | HOUR | 5.00 | 17.86 | 89.30 | _____ |
| LABOR (IRRIGATION) | HOUR | 5.00 | 3.00 | 15.00 | _____ |
| HAND LABOR | HR. | 5.00 | 10.06 | 50.30 | _____ |
| INTEREST ON OP. CAP. | DOL. | 0.14 | 365.23 | 51.13 | _____ |
| OVERHEAD COST | DOL. | 0.05 | 757.44 | 37.87 | _____ |
| | | | | ----- | |
| TOTAL VARIABLE COST | | | | \$ 795.31 | _____ |
| FIXED COSTS | | | | | |
| MACHINERY DEPRECIATION* | ACRE | 60.16 | 1.00 | \$ 60.16 | _____ |
| MACHINERY INTEREST* | ACRE | 114.44 | 1.00 | 114.44 | _____ |
| MACHINERY INSURANCE* | ACRE | 3.46 | 1.00 | 3.46 | _____ |
| MACHINERY TAXES* | ACRE | 9.22 | 1.00 | 9.22 | _____ |
| IRRIGATION DEPRECIATION | ACRE | 50.00 | 1.00 | 50.00 | _____ |
| IRRIGATION INTEREST | ACRE | 122.50 | 1.00 | 122.50 | _____ |
| IRRIGATION INSURANCE | ACRE | 1.75 | 1.00 | 1.75 | _____ |
| TAXES (LAND & IRRIGATION) | ACRE | 62.00 | 1.00 | 62.00 | _____ |
| INTEREST ON ESTAB. COST | ACRE | 4864.36 | 0.14 | 681.01 | _____ |
| LAND (NET RENT) | ACRE | 1.00 | 110.00 | 110.00 | _____ |
| | | | | ----- | |
| TOTAL FIXED COSTS | | | | \$1214.54 | _____ |
| TOTAL COSTS | | | | \$2009.85 | _____ |

* INCLUDES MACHINE SHED AND SHOP.

TABLE 5A: THIRD YEAR SCHEDULE OF OPERATIONS AND COSTS PER ACRE OF ESTABLISHING
A JONAGOLD OR GALA APPLE ORCHARD IN CENTRAL WASHINGTON.*

| OPERATION | TOOLING | MONTH | VARIABLE COST | | | | | | | | TOTAL VARIABLE COST | TOTAL COST |
|----------------|---------------------------------|---------|---------------|----------------|---------------|------------------------|--------|--------|---------|-----------|---------------------------|---------------|
| | | | HOURS | LABOR HOURS | FIXED COST | FUEL,OIL, LUBE,AND, | | LABOR | SERVICE | MATERIALS | | |
| | | | | | | REPAIRS | | | | | | |
| | | | | | \$ | \$ | \$ | \$ | \$ | \$ | \$ | |
| PRUNE & TRAIN | HAND LABOR, PRUNING TOOLS | DEC-MAR | 0.0 | 12.00 | 1.00 | 0.0 | 60.00 | 0.0 | 75.00 | 135.00 | 136.00 | |
| IRRIGATE | SOLID SET, 24AC.IN. | APR-OCT | 0.0 | 4.20 | 174.25 | 25.92 | 21.00 | 50.00 | 0.0 | 96.92 | 271.17 | |
| IRRIGATE | 4-WHEEL SCOOTER | APR-OCT | 1.00 | 0.0 | 2.03 | 2.08 | 0.0 | 0.0 | 0.0 | 2.08 | 4.11 | |
| MILDEW SPRAY | 50HP-WT.,400 GAL. BLAST SPRAYER | APR | 0.35 | 0.42 | 8.39 | 5.56 | 2.10 | 0.0 | 19.61 | 27.27 | 35.66 | |
| MOW WEEDS | 50HP-WT, 8' MOWER | MAY | 0.50 | 0.60 | 3.74 | 4.19 | 3.00 | 0.0 | 0.0 | 7.18 | 10.92 | |
| FRUIT REMOVAL | HAND LABOR | MAY | 0.0 | 1.30 | 0.0 | 0.0 | 6.50 | 0.0 | 0.0 | 6.50 | 6.50 | |
| MILDEW SPRAY | 50HP-WT.,400 GAL. BLAST SPRAYER | MAY | 0.35 | 0.42 | 8.39 | 5.56 | 2.10 | 0.0 | 19.61 | 27.27 | 35.66 | |
| MOW WEEDS | 50HP-WT, 8' MOWER | JULY | 0.50 | 0.60 | 3.74 | 4.19 | 3.00 | 0.0 | 0.0 | 7.18 | 10.92 | |
| HERB. APPLIC. | 50HP-WT, WEED SPRAYER | JULY | 1.00 | 1.20 | 6.45 | 7.76 | 6.00 | 0.0 | 22.88 | 36.64 | 43.09 | |
| APHID CONTROL | CUSTOM AERIAL | JULY | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.50 | 9.36 | 14.86 | 14.86 | |
| FERTILIZE | 35HP-WT, FERT. SPR. BDCT | AUG | 0.25 | 0.30 | 2.18 | 1.61 | 1.50 | 0.0 | 11.07 | 14.18 | 16.36 | |
| MOW WEEDS | 50HP-WT. 8' MOWER | OCT | 0.50 | 0.60 | 3.74 | 4.19 | 3.00 | 0.0 | 0.0 | 7.18 | 10.92 | |
| FERTILIZE | 35HP-WT, FERT. SPREADER | NOV | 0.25 | 0.30 | 2.18 | 1.61 | 1.50 | 0.0 | 46.13 | 49.24 | 51.42 | |
| HERB. APPLIC. | 35HP-WT, WEED SPRAYER | NOV | 1.00 | 1.20 | 5.98 | 5.40 | 6.00 | 0.0 | 26.10 | 37.50 | 43.48 | |
| GOPHER CONTROL | 50HP-WT, GOPHER MACHINE | NOV | 0.25 | 0.30 | 2.73 | 2.13 | 1.50 | 0.0 | 7.35 | 10.98 | 13.71 | |
| MOUSE CONTROL | CUSTOM AERIAL | NOV | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.50 | 10.70 | 15.20 | 15.20 | |
| MISC-USE | 4-WHEEL SCOOTER | ANNUAL | 0.50 | 0.60 | 1.01 | 1.04 | 3.00 | 0.0 | 0.0 | 4.04 | 5.05 | |
| MISC USE | 1/2 TON PICK-UP | ANNUAL | 6.00 | 7.20 | 32.30 | 20.27 | 36.00 | 0.0 | 0.0 | 56.27 | 88.57 | |
| MISC USE | 50HP-WT, TRAILER | ANNUAL | 0.50 | 0.60 | 3.24 | 3.47 | 3.00 | 0.0 | 0.0 | 6.47 | 9.71 | |
| MISC USE | SHOP TOOLS | ANNUAL | 0.0 | 0.0 | 12.13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 12.13 | |
| BUILDING | MACHINE SHED AND SHOP | ANNUAL | 0.0 | 0.0 | 88.72 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 88.72 | |
| INTEREST | OPERATING CAPITAL | ANNUAL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 34.31 | 0.0 | 34.31 | 34.31 | |
| OVERHEAD | UTILITIES,LEGAL,ACCT.,ETC. | ANNUAL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 29.81 | 0.0 | 29.81 | 29.81 | |
| TAXES | LAND & IRRIGATION | ANNUAL | 0.0 | 0.0 | 62.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 62.00 | |
| 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 | 962.39 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 962.39 | |
| TOTAL PER ACRE | | | 12.95 | 31.84 | 1496.59 | 94.98 | 159.20 | 124.12 | 247.80 | 626.10 | 2122.69 | |

* COST BASED ON ESTABLISHING A 100 ACRE ORCHARD WITH 93% OF THE TOTAL
AREA PLANTED TO TREES.