

328 Madera Avenue  
Madera, CA 93637

**COSTS FOR  
ESTABLISHING AND PRODUCING WALNUTS  
EARLY-LEAFING LATERAL-BEARING  
Southern San Joaquin Valley - 1989**

G. Steven Sibbett, Tulare County Farm Advisor; Mark Freeman, Fresno County Farm Advisor; Robert Beede, Kings County Farm Advisor; H. Rocky Teranishi, Madera County Director; Karen Klonsky, Extension Area Economist, UC Davis; James Du Bruille, Staff Research Associate, University of California, Davis

1. **YIELD:**

Yield (lbs/acre) Walnut Variety Type	<u>Year</u>					Mature
	4	5	6	7		
Early-Leafing Lateral-Bearing	300	700	1200	2000	3500	

2. **ACREAGE:**

The cost studies are based on a 60-acre orchard of which 3 acres are for roads and burn areas.

3. **SPACING:**

Terminal bearing orchards are spaced 35' by 35' with 35 trees per acre. Lateral bearing orchards are planted 28' by 28' with 55 trees per acre.

4. **VARIETIES:**

A cost of establishment and a cost of production study was developed for each of three walnut variety types; (1) early-leafing lateral-bearing, (2) late-leafing lateral-bearing and (3) late-leafing terminal-bearing. There are several differences among variety types that affect costs, labor and equipment requirements and yield. The most significant difference is the number of trees per acre; terminal-bearing trees are planted fewer to the acre than lateral-bearing. For the late-leafing varieties less pesticide applications are made than for the early-leafing varieties. Terminal bearing trees require less pruning per tree than lateral-bearing trees. Of course terminal-bearing varieties bear more slowly than lateral-bearing varieties. This is reflected in the establishment cost studies in the fifth, sixth and seventh years. The differences in production practices among the three variety types will be explained in detail.

In accordance with applicable State and Federal laws and University policy, the University of California does not discriminate in any of its policies, procedures or practices on the basis of race, religion, color, national origin, sex, marital status, sexual orientation, age, veteran status, medical condition, or handicap. Inquiries regarding this policy may be addressed to the Affirmative Action Director, University of California, Agriculture and Natural Resources, 300 Lakeside Drive, 6th Floor, Oakland, CA 94612-3560. (415) 987-0097.

5. IRRIGATION: Applied water pumped. System is 70% efficient. A pipeline irrigation system is used. The first three years are flood irrigated. Borders are put up after that and the row middles are mowed. Water applications rates are as follows:

---

<u>Year</u>	<u>Acre Feet/Year</u>
1	1
2	1
3	2.0
4	3.0
5	5.0
6	5.7
7	5.7
8+	5.7

---

6. FERTILIZER:  
The rate of actual nitrogen applied is as follows:

---

<u>Year</u>	<u>Lbs/Ac/Year</u>
1	6
2	12
3	27
4	54
5	54
6	108
7	108
8+	150

---

7. PESTICIDES:

Insect and Disease Control

Early-Leafing Varieties years 3-5 - 1 spray (bacteriocide)

Year 6 & older - 3 sprays (1 bacteriocide, 2 insecticide/miticide)

Late-Leafing Varieties - 1 insecticide spray year 4 and every other year thereafter.

Weed Control - Herbicides are applied on the borders, which is 25% of the acreage (one preemergence" and one "contact" application).

8. PRUNING:

Starting in year 5 a pruning tower is rented.

---

<u>Year</u>	<u>Lateral-Bearing</u>	<u>Terminal-Bearing</u>
	<u>(early-leafing and late-leafing)</u>	<u>(late-leafing)</u>
	<u>Hours/Acre</u>	
1	0.5	0.33
2	1	0.67
3	2	0.67
4	3	1
5	2	1
6	3	1.2
7	3	1.2
8+	4	1.2

---

9. BRUSH REMOVAL:  
Brush is removed by hand in establishment years. After that a shredder is used.
  
10. HARVEST:  
The first bearing year is hand-picked with the picker receiving half the crop. Following years are mechanically harvested. The custom rate includes a one ton minimum charge. Ethephon is applied to promote harvest on early-leaving lateral-bearing varieties.
  
11. INTEREST:  
An operating interest rate of 11% was assumed. Operating capital is assumed to be borrowed for 6 months of each establishment and producing year. Interest is also charged on accumulated cash costs in establishment years to reflect interest charged on a long-term establishment loan. Interest is also charged at 11% on investment capital to account for the income foregone by keeping money tied up in capital equipment.
  
12. OVERHEAD COSTS:  
County taxes represent a set fee while office and business costs are estimated at about 8% of the total cultural costs. They include such costs as preparing roadways, general weed control, office, bookkeeping, etc.
  
13. FUEL & REPAIR:  
Included are the cost of fuel, maintenance, replacement parts, tires, etc.
  
14. INVESTMENT COST:  
In allocating the equipment cost per acre, the following calculations were made: (a) "Original Cost" of equipment is the estimated new cost and includes 6% sales tax. (b) "Cost Per Acre" is the new cost divided by the number of acres the equipment will be used on. (c) "Depreciation" is based on the "Per Acre Cost" divided by the expected life of the equipment. (d) "Interest" on investment is figured on one-half of the new cost per acre multiplied by 11%. (e) The investment cost per acre is calculated as 60% of the cost of all new equipment to reflect a mix of new and used equipment.
  
15. Land is valued at \$5000 per acre. An interest rate of 11% is applied. At full production, the land is assessed at \$8000/acre for tax purposes. The ranch is not included in the Williamson Act.

EARLY-LEAFING LATERAL-BEARING  
Southern San Joaquin Valley - 1989

Costs are for an orchard planted 28' X 28', with 55 trees/acre. A pipeline irrigation system is used.

Skilled labor: \$8.00 per hour                      Interest rate: 12.0%  
Field labor: \$6.00 per hour

YEAR	Costs per Acre						
	1st	2nd	3rd	4th	5th	6th	7th
YIELD (Pounds/acre)				300	700	1,200	2,000
<b>Planting costs</b>							
Land preparation: subsoil & level - contract	160						
Disk and Float: 4 hours - labor and tractor	76						
Trees: 55 @ \$9.50 (+2 2nd Yr. and 1 3rd Yr.)	523	19	10				
Survey and Plant: 55 @ \$1.50	83	3	2				
<b>TOTAL PLANTING COSTS</b>	<b>\$841</b>	<b>\$22</b>	<b>\$11</b>				
<b>Cultural costs:</b>							
Prune and train (skilled hand labor)	\$4	\$8	\$15	\$23	\$55	\$83	\$112
Brush disposal	5	9	20	20	20	20	20
Tillage and Irrigation Preparation:							
7 hrs. yr. 1 1 hr. yr. 2+	127	17	17	17	17	17	17
Put up borders	30	0	0	0	0	0	0
Mow middles	0	65	65	65	65	65	65
Weed control sprays (material & application)	0	42	42	42	42	42	42
Irrig. labor: 4 hrs. 1st yr. 1 hr. yrs. 2+	24	6	6	6	6	6	6
Water @ \$20/ac. ft. + \$6/ac. district tax	26	26	46	92	106	120	120
Fertilizer: Nitrogen \$0.33/lb							
.5 hr. labor and tractor	7	7	7	7	7	7	7
Pest control sprays	0	0	12	12	12	60	60
Custom application	0	0	15	15	15	45	45
Miscellaneous labor and power - 1 hour	16	16	16	16	16	16	16
Pick-up truck costs	25	25	25	25	25	25	25
<b>TOTAL CULTURAL COSTS</b>	<b>\$266</b>	<b>\$225</b>	<b>\$295</b>	<b>\$358</b>	<b>\$404</b>	<b>\$542</b>	<b>\$585</b>
<b>Harvesting Costs:</b>							
Hand pick - \$.45/lb for 50% of crop				68	158		
1st Pick - 80% of crop, \$130/ton, 1 ton min.						130	130
2nd Pick - \$80/acre						80	80
Hull and dry - \$75/ton				11	26	45	75
<b>TOTAL HARVEST COSTS</b>				<b>\$79</b>	<b>\$184</b>	<b>\$255</b>	<b>\$285</b>
<b>Overhead Costs:</b>							
Office and business costs	100	100	100	100	100	100	100
County Taxes	54	54	54	54	54	153	169
Insurance	3	3	3	3	3	3	3
<b>TOTAL OVERHEAD COSTS</b>	<b>\$158</b>	<b>\$158</b>	<b>\$158</b>	<b>\$158</b>	<b>\$158</b>	<b>\$256</b>	<b>\$273</b>
<b>TOTAL CASH COSTS</b>	<b>\$1,265</b>	<b>\$404</b>	<b>\$464</b>	<b>\$595</b>	<b>\$746</b>	<b>\$1,053</b>	<b>\$1,142</b>
<b>ACCUMULATED CASH COSTS</b>	<b>\$1,265</b>	<b>\$1,669</b>	<b>\$2,133</b>	<b>\$2,728</b>	<b>\$3,473</b>	<b>\$4,527</b>	<b>\$5,669</b>

YEAR	Costs per Acre						
	1st	2nd	3rd	4th	5th	6th	7th
<b>Depreciation:</b>							
Buildings, equipment and irrigation system	80	80	80	80	80	80	80
<b>TOTAL DEPRECIATION</b>	<b>\$80</b>	<b>\$80</b>	<b>\$80</b>	<b>\$80</b>	<b>\$80</b>	<b>\$80</b>	<b>\$80</b>
<b>Interest on Investment</b>							
Buildings, equipment and irrigation system	52	52	52	52	52	52	52
Land \$5000/acre	600	600	600	600	600	600	600
Interest on accumulated cash costs	152	200	256	327	417	543	680
<b>TOTAL INTEREST ON INVESTMENT</b>	<b>\$804</b>	<b>\$852</b>	<b>\$908</b>	<b>\$979</b>	<b>\$1,069</b>	<b>\$1,195</b>	<b>\$1,332</b>
<b>TOTAL COST FOR THE YEAR</b>	<b>\$2,148</b>	<b>\$1,337</b>	<b>\$1,452</b>	<b>\$1,654</b>	<b>\$1,894</b>	<b>\$2,329</b>	<b>\$2,554</b>
<b>CREDIT FROM HARVEST @ \$0.45/POUND</b>				\$135	\$315	\$540	\$900
<b>NET COST FOR THE YEAR</b>	<b>\$2,148</b>	<b>\$1,337</b>	<b>\$1,452</b>	<b>\$1,519</b>	<b>\$1,579</b>	<b>\$1,789</b>	<b>\$1,654</b>
<b>TOTAL ACCUMULATED NET COST</b>	<b>\$2,148</b>	<b>\$3,485</b>	<b>\$4,937</b>	<b>\$6,456</b>	<b>\$8,035</b>	<b>\$9,824</b>	<b>\$11,478</b>

SAMPLE COSTS TO PRODUCE ENGLISH WALNUTS  
Early-Leafing and Lateral-Bearing  
Southern San Joaquin Valley - 1989

Labor Rate: \$8.00/hr. skilled labor                      Interest Rate: 12%  
\$6.00/hr. field labor                                      Yield - dry (lbs/acre): 3,500

Operation	Tractor/ Implement No.	Implement No.	Hours	Cash and Labor Costs per Acre					Total Cost	Your Cost
				Labor Cost/A	Fuel & Repairs	Material Cost	Custom /Rent			
<b>Cultural costs:</b>										
Pruning			4.0	\$32.00			\$80.00		\$112	
Brush Disposal	1	6	1.2	10.56	\$9.59				20	
Fertilize (150# N @ \$.33)						\$49.50	6.00		56	
Spray: Pest Control 4X						110.00	60.00		170	
Tillage and irrig. prep.	1	2	1.0	8.80	8.55				17	
Irrigation (8 X 8.5" = 68")		8				120.00			120	
Labor			1.0	6.00					6	
Spray: Weed Control							42.00		42	
How (8 times)	1	4	4.0	35.20	29.39				65	
Miscellaneous			1.0	8.00	7.50				16	
Costs for pick up truck					25.00				25	
Interest on operating capital @ 12%									41	
<b>TOTAL CULTURAL COSTS</b>			12	\$101	\$80	\$280	\$188		\$689	
<b>Harvest Costs:</b>										
1st Pick and Haul - 80%							\$182		\$182	
2nd Pick - 20%							80		80	
Hull & Dry							131		131	
<b>TOTAL HARVEST COSTS</b>								\$393	\$393	
<b>Cash overhead:</b>										
Office and business costs									\$83	
County Taxes									112	
Equipment Insurance									3	
<b>TOTAL CASH OVERHEAD COSTS</b>									\$198	
<b>TOTAL CASH COSTS</b>									\$1,281	
<b>TOTAL CASH COST/TON:</b>								3500 lbs/acre yield	\$732	
<b>Investment</b>										
		Per production		Annual Cost						
		Acres		Depreciation	Interest @ 12%					
Land (bare)		\$5,000				\$600			\$600	
Equipment & buildings		863		\$80		52			132	
Trees (40 yr. depreciation)		11,478		287		689			976	
<b>TOTAL INVESTMENT COSTS</b>		\$ 17,341		\$367		\$1,340			\$1,707	
<b>TOTAL COSTS PER ACRE</b>									\$2,988	
<b>TOTAL COST/TON:</b>								3500 lbs/acre yield	\$1,708	

EARLY-LEAFING LATERAL-BEARING WALNUTS  
MONTHLY SUMMARY OF PER ACRE CASH COSTS

Production Year: October - September  
Southern San Joaquin Valley - 1989

Operation	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
<b>Cultural costs:</b>													
Pruning				112.0									\$112
Brush Disposal				20.1									20
Fertilize (150# N)								27.8			27.8		56
Spray: Pest Control*						63.8			26.6	26.6	53.1		170
Tillage & irrig. prep											17.3		17
Irrigation (B X B.5")					6.7	6.7	13.3	13.3	26.7	26.7	26.7		120
Labor					.8	.8	.8	.8	.8	1.1	1.1		6
Spray: Weed Control**		31.3						10.7					42
Mow 5X					12.9		12.9	12.9	12.9		12.9		65
Miscellaneous							7.8					7.8	16
Pick-up truck costs	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	25
Interest on operating capital @ 11%		.4	.4	1.7	2.0	2.7	3.1	3.8	4.5	5.2	6.6	10.7	41
<b>TOTAL CULTURAL COSTS</b>	<b>\$2</b>	<b>\$34</b>	<b>\$2</b>	<b>\$136</b>	<b>\$24</b>	<b>\$76</b>	<b>\$40</b>	<b>\$71</b>	<b>\$74</b>	<b>\$62</b>	<b>\$148</b>	<b>\$21</b>	<b>\$689</b>
<b>Harvest Costs (1.75 tns/A):</b>													
Shake											182.0		182
Sweep & Pick Up											80.0		80
Hull & Dry											131.3		131
<b>TOTAL HARVEST COSTS</b>											<b>\$393</b>		<b>\$393</b>
<b>Cash overhead:</b>													
Office and business	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	83
County Taxes			55.9				55.9						112
Equipment Insurance				3.5									3
<b>TOTAL CASH OVERHEAD</b>	<b>\$7</b>	<b>\$7</b>	<b>\$63</b>	<b>\$10</b>	<b>\$7</b>	<b>\$7</b>	<b>\$63</b>	<b>\$7</b>	<b>\$7</b>	<b>\$7</b>	<b>\$7</b>	<b>\$7</b>	<b>\$198</b>
<b>TOTAL CASH COSTS</b>	<b>\$9</b>	<b>\$41</b>	<b>\$65</b>	<b>\$146</b>	<b>\$31</b>	<b>\$83</b>	<b>\$103</b>	<b>\$78</b>	<b>\$80</b>	<b>\$69</b>	<b>\$155</b>	<b>\$421</b>	<b>\$1,281</b>

\* Includes Ethrel application at harvest.

\*\* Preemergence in November. Contact in May.

EQUIPMENT AND BUILDING LIST FOR EARLY-LEAFING LATERAL-BEARING ENGLISH WALNUTS  
Southern San Joaquin Valley - 1989

Interest Rate: 12%

Fuel Cost per Gallon \$.80  
\$.86

ITEM #	DESCRIPTION	NEW COST	ANNUAL USE (ACRES)	COST PER ACRE	LIFE (HRS)	YEARS TO TRADE	---OVERHEAD*---		--- HOURLY COSTS ---			
							DEPREC-	INTEREST*	TAR*	FUEL*	REPAIRS*	TOTAL
Tractors:												
1	55 HP wheel diesel	\$20,000	60	\$333	12,000	10	\$33.33	\$20.00	120%	\$2.95	\$2.00	\$4.95
2	Disc, tandem 14'	7,500	60	125	2,500	10	12.50	7.50	120		3.60	3.60
3	Float	2,000	60	33	2,500	10	3.33	2.00	120		.96	.96
4	Mower	4,000	60	67	2,000	10	6.67	4.00	120		2.40	2.40
5	Brush rake	1,000	60	17	2,500	15	1.11	1.00	100		.40	.40
6	Brush shredder	7,600	60	127	2,500	10	12.67	7.60	100		3.04	3.04
7	Weed sprayer, SP	1,650	60	28	2,000	10	2.75	1.65	120	2.58	.99	3.57
8	Pipeline irrigation system	24,000	60	400	27,000	20	20.00	24.00	10		.09	.09
9	Pick-up, 1/2 ton	14,000	60	233	2,000	7	33.33	14.00	60			
	Miscellaneous shop tools	4,500	60	75		10	7.50	4.50				
	Buildings	12,000	60	200		30	6.67	12.00				
TOTAL COST		\$86,250		\$1,438			\$133	\$86				
60% OF NEW COSTS*		\$51,750		\$863			\$80	\$52				

\* DEFINITIONS:

- YEARS TO TRADE----- The projected life of the machine in years adjusted for excessive annual use.
- OVERHEAD ----- Per acre per year.
- DEPRECIATION ----- "COST PER ACRE" divided by "YEARS TO TRADE"
- INTEREST----- ("COST PER ACRE" X "INTEREST RATE") divided by 2 = average interest cost per acre per year.
- TAR----- Total accumulated repairs. The total cost of repairs during the machine's life expressed as a percent of "NEW COST". Calculated from equations based on equipment type and annual use.
- HOURLY COST OF FUEL----- Diesel fuel, oil and lube costs per hour = HP x cost of diesel fuel/gal X 0.0667.  
Gasoline fuel, oil and lube costs per hour = HP x cost of gasoline/gal X 0.0889.
- HOURLY COST OF REPAIRS-- ("NEW COST" X "TAR") divided by ("LIFE IN HOURS").
- 60% OF NEW COSTS ----- Used to reflect a mix of new and used equipment.



COST TO PRODUCE EARLY-LEAFING LATERAL-BEARING WALNUTS AT VARYING PRICES AND YIELDS

	YIELD (Pounds/acre)								
	1000	1500	2000	2500	3000	3500	4000	4500	5000
Cultural Costs	689	689	689	689	689	689	689	689	689
Harvest Costs	222	240	259	304	349	393	438	483	528
Cash Overhead	198	198	198	198	198	198	198	198	198
Cash cost/acre	1,109	1,128	1,147	1,191	1,236	1,281	1,326	1,370	1,415
Cash cost/ton	2,218	1,504	1,147	953	824	732	663	609	566
Investment cost	1,707	1,707	1,707	1,707	1,707	1,707	1,707	1,707	1,707
TOTAL COST/ACRE	2,816	2,835	2,854	2,899	2,943	2,988	3,033	3,078	3,122
TOTAL COST/TON	5,633	3,780	2,854	2,319	1,962	1,708	1,516	1,368	1,249

PER ACRE INCOME ABOVE CASH COSTS AT VARYING PRICES AND YIELDS

Dollars per Dry In-shell Pound	YIELD (Pounds/acre)								
	1000	1500	2000	2500	3000	3500	4000	4500	5000
.30	-809	-678	-547	-441	-336	-231	-126	-20	85
.35	-759	-603	-447	-316	-186	-56	74	205	335
.40	-709	-528	-347	-191	-36	119	274	430	585
.45	-659	-453	-247	-66	114	294	474	655	835
.50	-609	-378	-147	59	264	469	674	880	1,085
.55	-559	-303	-47	184	414	644	874	1,105	1,335
.60	-509	-228	53	309	564	819	1,074	1,330	1,585

PER ACRE INCOME ABOVE TOTAL COSTS AT VARYING PRICES AND YIELDS

Dollars per Dry In-shell Pound	YIELD (Pounds/acre)								
	1000	1500	2000	2500	3000	3500	4000	4500	5000
.30	-2,516	-2,385	-2,254	-2,149	-2,043	-1,938	-1,833	-1,728	-1,622
.35	-2,466	-2,310	-2,154	-2,024	-1,893	-1,763	-1,633	-1,503	-1,372
.40	-2,416	-2,235	-2,054	-1,899	-1,743	-1,588	-1,433	-1,278	-1,122
.45	-2,366	-2,160	-1,954	-1,774	-1,593	-1,413	-1,233	-1,053	-872
.50	-2,316	-2,085	-1,854	-1,649	-1,443	-1,238	-1,033	-828	-622
.55	-2,266	-2,010	-1,754	-1,524	-1,293	-1,063	-833	-603	-372
.60	-2,216	-1,935	-1,654	-1,399	-1,143	-888	-633	-378	-122