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Joseph W. Osgood, Farm Advisor,
UC, Davis
TEHAMA COUNTY
TO WALNUTS
SYSTEMS APPROACH

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, George A. Harsh, Director of the Service.

AGRICULTURAL EXTENSION SERVICE
UNIVERSITY OF CALIFORNIA

AUTHORS ---

Joseph W. Osgood, Farm Advisor,
Tehama County

A. D. Rizzi, Extension Pomologist
UC, Davis

Philip S. Parsons, Ext. Economist
UC, Davis

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B. Alcorn, Director of Extension Ser-
vice, University of California.

SYSTEMS APPROACH TO WALNUTS
TEHAMA COUNTY

The newer walnut varieties need different management than the varieties that are 30 to 50 years old. To separate new management techniques and stress the interrelationships of the various components of production a systems or package approach to management is needed. On this point the systems approach emphasizes the importance of each step in establishing an orchard, the efficiency of that particular operation, and its influence on other operations. For example, if a planting distance of 25 feet square is used this influences the location of irrigation lines, sprayer sizes, pruning equipment, etc.

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Soils should be well drained and deep so that roots can penetrate rapidly and deeply. Soils that contain hardpans, claypans, other obstructions, and substratum layers of coarse sand or gravel should be avoided for walnuts. In Tehama County the Columbia and Vina series are the major soil types suitable for walnuts. Other series suitable for walnuts are Los Robles, Maywood, Molinos, Orland, Wyo, Yolo, and Zamora. There is some variation within soil series and between soil series so that each potential site should be evaluated separately and not assumed to be suitable for walnuts based solely on the series mapped.

The rootstock generally used for these soils is Northern California Black. This is an excellent rootstock that is highly resistant to oak root fungus. It is not tolerant of high water table.

or heavy soils and it is susceptible to crown rot and root lesion nematodes. It is compatible to all varieties and is non-dwarfing.

Paradox hybrid rootstock is tolerant of crown rot and high water table but in some areas appears to be more susceptible to crown gall. It is susceptible to oak root fungus. Young trees on paradox tend to be more vigorous than those on black rootstock; but as mature trees there is little or no difference in tree size or yield when the trees are located in the better orchard soils. More complete rootstock information can be obtained in leaflet AXT-120.

The new walnut varieties which appear to be suitable to Tehama County are Vina, Chico, Serr, and Tehama. The varieties Pedro and Amigo are sometimes used as pollinizers, and they also are adapted to this area. At the present time, Vina appears to be exceptionally well adapted to the areas where frost is no problem. In addition to its apparent adaptability, there is more information available on Vina's performance than on the other varieties.

Planting distances, in general, will be about 30 foot square. This provides 45 trees per acre. The possible exception to this would be the Serr variety that is much more vigorous than the other varieties, as a young tree and may crowd too soon at this planting distance.

There are several schemes in which varieties, rootstocks, or combinations can be set out so that a hedge is included in the original planting. By pulling every other row on the diagonal, half of the trees are removed and the orchard is rotated 45° and can be considered 42 foot square.

This removal could be an exceptionally heavy bearing variety that was planted as a temporary variety or if two equally promising varieties are planted the one best adapted to that particular site could be retained. This scheme could also be used with rootstock (say 50% black and 50% paradox).

A much later removal of half of the remaining trees will rotate the orchard to the original direction and result in a 60 foot square planting. At this time an additional hedge could be included with a choice of rootstock and/or varieties.

The original tree spacing could be reduced to 25 feet by 25 feet on second choice soils. This would result in about 70 trees per acre as planted and 35 trees per acre after the first trees are removed.

Proper pruning of heavier bearing walnut trees is absolutely essential to insure proper limb spacing and tree size. As the trees mature, proper pruning is necessary to control total crop and nut size.

As a general rule one-third to one-half of the previous season's growth is removed from limbs that are to be used while the other limbs are completely removed or stubbed back to 3 buds (for trunk shade). "Training Young Walnut Trees"-- AXT 86 covers this subject very well.

Pollination of walnuts is necessary for maximum crop production and pollinating varieties should be included in the original planting pattern. Generally, the varieties Pedro, Chico and Amigo are used to pollinate the new varieties. This information is revised annually and is available as a reprint.

Removal of temporary trees involves a period of time ranging from three to five years, depending somewhat on the variety chosen, pruning practices, and irrigation - fertilization practices. In general, the lower one to three limbs will be removed on the temporary trees when the trees are about eight years old. The removal is based on major limbs that come close to permanent trees so that shading would reduce the vigor of the permanent tree. Limb removal on temporary trees continues until it is no longer economical to maintain it as a tree and then it is removed.

Irrigation methods can be of any type as long as adequate water can be properly applied. Most of the walnut soils do not have infiltration problems and application rates of 0.25 to 0.5 inches per hour are common. On some heavier soils with lower infiltration rates, a sprinkler system is desirable as it offers more accurate control of application rates and timing.

Fertilization normally consists of nitrogen only although there are some small areas that are zinc deficient and potassium deficient. Boron has been found in small amounts in some wells and streams, however, if the boron content of the water is less than 1 ppm the possibility of economic damage is very remote. More details are available in AXT 238.

Mature walnut orchards require 36 acre-inches of irrigation water and 150 to 200 pounds of actual nitrogen per acre per year.

From the brief preceding discussion it is apparent that several interrelated operations must be coordinated in order to establish a new walnut orchard that will produce the most pounds of meat per acre for a minimum of cost per pound.

SAMPLE COSTS

The following sample costs to develop a walnut orchard in Tehama County are based on several assumptions that may not be valid for any particular orchard. The size of 200 acres, as a unit has been selected as this acreage is near optimum for one spray rig. Currently more acres can be sprayed but it is felt that walnut husk fly and walnut blight will require close timing of sprays and a larger acreage would require too long to spray for accurate timing.

Equipment needed for young walnut trees is rather minimal and in this particular study a tractor powerful enough to operate a mower or shredder, handle a suitable disc, and a weed sprayer is adequate. Harvesting and drying equipment is not included and these operations are figured at custom rates through the sixth year.

Assumptions used to develop costs of establishing a walnut orchard are found on page 8.

SAMPLE COSTS TO DEVELOP A WALNUT ORCHARD

Year	1
Yield - pounds	-
Land preparation	20
Layout, plant, and stake @ 50¢ tree	35
Trees - 70 @ \$3.00	210
Stakes @ 35¢ tree	25
Total Planting Costs	290
Prune and brush disposal	5
Fertilize	-
Spray or paint	10
Cultivate or mow	25
Irrigate (3 acre-feet)	20
Weed spray	10
Miscellaneous	52
Total Cultural Costs	122
Custom Harvest @ 5¢ per pound	-
Total Cultural and Harvest Costs	412
Interest and depreciation on investment	105
Taxes	20
Management	30
Interest on accumulated costs	-
Total Overhead Costs	155
Total Cost Per Acre	567
Income @ 25¢ per pound	-
Net Cost Per Acre	567
Accumulated Cost	567
Investment	
Land	1,200
Trees	10
Buildings	10
Equipment	150
Total Investment	1,360

Based on 200 acres planted 25' x 25', 70 trees per acre

2	3	4	5	6
	-	500	750	1,500
20				
3				
23				
				19
		15	16	17
	10	10	20	30
25	25	25	10	10
20	20	20	20	20
10	10	10	10	10
12	14	14	14	16
74	86	107	105	122
		25	37	75
97	86	32	42	197
105	105	105	105	105
20	20	25	30	40
30	30	30	30	30
40	60	81	99	114
195	215	248	264	289
292	301	373	406	486
		125	188	375
292	301	248	218	111
859	1,160	1,408	1,626	1,737
1,200	1,200	1,200	1,200	1,200
567	859	1,160	1,408	1,626
10	10	10	10	10
150	150	150	150	150
1,927	2,219	2,520	2,768	2,986

Land:	Valued at \$1,200 per acre ready to plant, carried at 7% interest.			
Equipment:	Carried at 7% interest on half new value and 10 years' depreciation.			
Trees:	Carried at 7% interest on accumulated costs through sixth year. Later years carried at 7% on half value and 20 years' depreciation.			
Harvest costs	are shown at a custom rate of 5¢ per pound which includes pre-harvest land preparation and delivery to receiving station.			
Culture	assumes furrow irrigation during first years and cultivation. Later years are with non-tillage, chemical weed control and sprinkler irrigation.			
Management	is carried at \$30 per acre and can be considered payment for organizational and planning activities.			
Tree removal	should be scheduled between 12 and 15 years for half of the trees and severe pruning the preceding 2 to 4 years.			

OTHER PUBLICATIONS ---

An Analysis of Walnut Production Costs
In California

Walnuts in Tehama County

Care of a Walnut Orchard

Training Young Walnut Trees

Walnut Rootstocks

Planting the Orchard with Seedling Walnut
Trees and Topworking

Combination Plantings of Old and New
Walnut Varieties

Selecting Suitable Walnut Varieties

Updating the Pollination Charts

Current Comparison and Crack Tests

Nutritional Deficiencies in California
Walnuts

Spraying Walnuts with Zinc

Diuron and Simazine for Weed Control in
Walnut Orchards

Walnut Husk Fly Trapping Procedures

Bark Canker of Persian (English) Walnut

Pest and Disease Control Program for Walnuts

101-3666

1970-71 California State University

Tehama County Farm and Home Advisors' Office

P. O. Box 370, Red Bluff, Ca 96080

Office Upstairs, Post Office Building

Telephone - Red Bluff 527 - 3101

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UC Cooperative Extension