

GREEN CHOP ALFALFA

PRODUCTION AND COSTS

SANTA BARBARA COUNTY



Warren E. Bendixen
Farm Advisor

Edward A. Yeary
Farm Advisor Statewide

Agricultural Extension Service
University of California
Santa Barbara County

ESTABLISHING AN ALFALFA STAND

Cost

Costs of establishing a stand of alfalfa are high. Every precaution should be taken to get a good stand of rapidly growing alfalfa. Sample costs to establish an alfalfa stand for border and sprinkler irrigation are shown on pages 2 and 3.

Seed Bed Preparation

The seed bed should be mellow, yet firm enough so the soil particles are in close contact with the seed.

Methods of Irrigation

The irrigation system should be designed and constructed to permit uniform distribution of adequate water with a minimum labor requirement.

The method and design of irrigation systems should be based on soil texture, soil depth, infiltration rate, slope of the land, and wind conditions.

If the alfalfa is to be border irrigated, the soil grade, width, and length of checks should be adapted to the soil texture. Border widths vary from 20' to over 100'. Border widths are determined by (1) amount of natural side fall; (2) the irrigation slope; (3) the amount of water available; and (4) the width of the harvesting machinery.

The gradual sloping sides of low, wide borders provide easy crossing of farm equipment and good alfalfa growth.

More detailed information on establishing borders is available from the University of California Circular 408, "The Border Method of Irrigation".

The construction of borders increases the cost of establishing a stand.

The cost of establishing an alfalfa stand is cheaper if sprinkler irrigation is used in the production of alfalfa.

Time of Seeding

In this area, alfalfa is planted during October and November, or February and March. Fall planting produces a higher yield the first year.

Method of Seeding

Alfalfa is seeded with a drill, or broadcast and covered with a culti-packer. Young alfalfa seedlings have a limited supply of reserve food and are not able to emerge when planted too deep. Planting depth should not exceed 3/4" in sandy soil, or 1/2" in finer textured soils.

(cont. on page 4)

SAMPLE COSTS - SANTA BARBARA COUNTY - 1966
 ESTABLISH AN ALFALFA STAND
 BORDER IRRIGATION - COASTAL AREA

Warren E. Bendixen
 Edward A. Yeary

Operations Cost

		<u>Fuel & Repairs</u>	<u>Deprec.</u>	<u>Int.</u>	<u>Total</u>
	CT Crawler Tractor-diesel-80 hp	3.80	1.80	1.00	6.60
Man Labor: 1.70/hour	WT Wheel Tractor-diesel-60 hp	1.36	.66	.32	2.34
	ST Wheel Tractor-30 hp	1.00	.40	.20	1.60

Operation	Hours/acre	Labor	Fuel & Repair	Materials		Cost/acre	
				Kind and Amount	Cost	Sample	Your
CULTURAL COST							
Pre-irrigation	1.00	1.70		Water .4 ac. ft./acre @ 6.50	2.60	4.30	
Disc 3x	CT .75	1.28	2.85			4.13	
Plow	WT .75	1.28	1.02			2.30	
Landplane	CT .50	.85	1.90			2.75	
Border disc	WT .10	.17	.14			.31	
Fertilize (custom)				Applic. \$2 - Fert. @ \$15	17.00	17.00	
Plant	ST .25	.43	.25	Seed - 30 lb/ac @ .50/lb.	15.00	15.68	
Ring roll	ST .25	.43	.25			.68	
Irrigate*	1.00	1.70		.4 ac. ft.@ 6.50 (sprinkled)	2.60	4.30	
Repair equipment			2.00			2.00	
Operating cost				office, car, oper. capital, ins., etc.	2.70	2.70	
Total Cultural Cost		7.84	8.41		39.90	56.15	
DEPRECIATION & INTEREST							
				<u>Depreciation</u>	<u>Interest 6%</u>		
				C Crawler Tractor-1.25 hr.	2.25	1.25	
				WT Wheel Tractor - .85 hr.	.56	.27	
				ST Wheel Tractor - .50 hr.	.20	.10	
				Bldgs. & other equipment - \$24 - 10 yr.	2.40	.72	
Total Depreciation & Interest					5.41	2.34	7.75
Total Cost							63.90

* A charge is not included for rental of a sprinkling system.

SAMPLE COSTS - SANTA BARBARA COUNTY - 1966
 ESTABLISH AN ALFALFA STAND
 SPRINKLER IRRIGATION - COASTAL AREA

Warren E. Bendixen
 Edward A. Yeary

Operations Cost

	<u>Fuel & Repairs</u>	<u>Deprec.</u>	<u>Int.</u>	<u>Total</u>
CT Crawler tractor-diesel-80 hp	3.80	1.80	1.00	6.60
Man Labor: 1.70/hour WT Wheel tractor-diesel-60 hp	1.36	.66	.32	2.34
ST. Wheel tractor-30 hp	1.00	.40	.20	1.60

Operation	Hours/acre	Labor	Fuel & Repair	Materials		Cost/acre	
				Kind and Amount	Cost	Sample	Your
CULTURAL COST							
Disc 3x	CT .75	1.28	2.85				4.13
Plow	WT .75	1.28	1.02				2.30
Landplane	CT .50	.85	1.90				2.75
Fertilize (custom)				Applic. \$2 - Fert. @ \$15	17.00		17.00
Plant	ST .25	.43	.25	Seed - 30 lb/ac @ .50/lb.	15.00		15.68
Ring roll	ST .25	.43	.25				.68
Sprinkle 2x	1.67	2.84		.5 ac. ft. @ 6.50	3.25		6.09
Repair equipment			1.50				1.50
Operating expense				office, car, oper. capital, ins., etc.	2.50		2.50
Total Cultural Cost		7.11	7.77		37.75		52.63
DEPRECIATION & INTEREST							
				<u>Depreciation</u>	<u>Interest 6%</u>		
				C Crawler Tractor-1.25 hr.	2.25	1.25	
				WT Wheel Tractor - .75 hr.	.50	.24	
				ST Wheel Tractor - .50 hr.	.20	.10	
				Bldgs. & other equipment - \$24 - 10 yr.	2.40	.72	
Total Depreciation & Interest					5.35	2.31	7.66
Total Cost							60.29

Planting rates vary from 15 to 30 lbs. of seed per acre. When the seed bed has been properly prepared, 20 to 25 lbs. of seed is sufficient for a good stand.

Inoculate seed to insure good nodulation.

Irrigation Practices

Irrigation schedules for young alfalfa should be based on the expanding root system. Seedling roots are small and near the soil surface. As the plants get older, the root system expands in width and depth.

Young alfalfa plants are stunted and unable to compete with weeds if the soil becomes dry in the area of the roots. Roots cannot grow through dry soil.

Weed Control

Prevent weed problems. Effective weed control in all crops in the rotation will reduce weeds in the alfalfa stand.

Proper land preparation and irrigation practices are good weed preventive measures. Planting certified or other high quality seed prevents planting weed seeds.

The alfalfa plants should be well established before clipping for weed control. Cutting 3" to 4" above the ground surface reduces competition and shading of weeds.

Chemical control practices are sometimes desirable. Check the current University of California weed control bulletin for recommendations.

ALFALFA PRODUCTION

Alfalfa grown in the coastal area of Santa Barbara County is primarily chopped green and fed directly to animals. The fog and high humidity in this area makes it difficult to cure alfalfa properly for baling.

IRRIGATION

The water requirement of alfalfa is high when compared with most crops because of the rapid growth and length of growing season.

Irrigation schedules vary with soil texture and season of the year. Usually one or two irrigations per cutting is sufficient.

Excess water from a single irrigation, or too frequent irrigations, will reduce yields and induce diseases.

In deep soils with no hardpans, alfalfa roots draw moisture from depths to 10' or more.

Border Irrigation

Water application efficiency up to 70% may be obtained. Approximately 40 to 54 acre inches of water per year are applied with border irrigation.

Yields are lower in the area of the borders. Border irrigated fields may produce

lower yields than sprinkler irrigation.

Sprinkler Irrigation

Sprinkler application costs per unit of water are higher than border irrigation.

Sprinkler irrigation costs may be as low or lower than border irrigation costs if the application efficiency is increased. Water application efficiency may be increased to 80%. Sprinkler irrigation applications range from approximately 36 to 48 acre inches per year.

FERTILIZATION

Alfalfa requires large amounts of plant nutrients. The soil may be able to supply all or a portion of these nutrients.

The need for fertilizers can be determined by applying fertilizer to a strip and then observing differences in growth. Yields may be taken and compared with untreated areas.

Soil and plant analyses are useful in determining phosphorus and potassium levels, when standard procedures are used in sampling, analyzing, and interpreting the results.

Nitrogen. Alfalfa plants which are well nodulated produce sufficient nitrogen for good production.

Phosphorus is the plant nutrient most likely to be deficient in alfalfa in Santa Barbara County. A yield of 8.5 tons/acre removes 35 to 45 lbs. of P/acre (80-104 lbs. P_2O_5).

On phosphorus deficient soils, a heavy application, 100-150 lbs. of P/acre (230-345 lbs. P_2O_5) will last for 3-4 years. Heavy applications result in deeper movement in the soil; better phosphorus uptake by the alfalfa; and save application costs. Annual applications of 35-45 lbs. of P/acre (80-104 lbs. P_2O_5) can be used.

Phosphorus deficient plants grow slower and have small, narrow leaves with a darker blue-green color than the normal plants.

Potassium is deficient on some soils. Deficiencies can be corrected with an application of 80 to 150 lbs. of K/acre (96-180 lbs. K_2O).

Potassium deficiency symptoms occur as small white dots, appearing first on the margin of the younger leaves and later spreading to the older leaves. Severely deficient plants have yellow marginal burn which later encompass the whole leaf.

CUTTING ALFALFA

Good quality, maximum yields, and prolonged life of the alfalfa stand are the advantages

of cutting the alfalfa at the 10% bloom stage. Cutting on a calendar basis, or when feed is needed, reduces profits.

For this area, the best indicator of 10% bloom is crown bud regrowth. If 60% of the alfalfa crowns have crown buds 1/2" to 3/4" long, it is time to cut.

Cutting the alfalfa in the pre-bloom stage results in lower yields, reduced crown vigor, and loss of stand.

When alfalfa is cut after the 10% bloom stage, new bud shoots are cut off, which weakens the plants and delays regrowth. The feed value is also lowered by cutting later than the 10% bloom stage.

ALFALFA PESTS

Nematodes

Alfalfa stem nematode is one of the most damaging pests to alfalfa in this area.

This nematode is a slender, almost colorless, eel-like worm about 1/20" long, which attacks the young shoots of alfalfa. It spreads rapidly by machinery and irrigation water. Injury is most severe in cool weather. Yields are reduced and stands killed by this pest.

Crop rotation and resistant varieties offer the only economical means of control.

Spotted Alfalfa Aphid

Aphid damage in this area is less severe than in the warmer climates. Aphid damage may occur in this area in September. Resistant varieties offer the best means of control.

DISEASES

Bacteria Wilt

Bacteria wilt, a severe disease in this area, shortens the life of the alfalfa stands. The use of wilt-resistant varieties is recommended for control.

Foliage Diseases

Fungus diseases on the foliage are very damaging in this cool, coastal area. Downy mildew, common leaf spot, stemphylium leaf spot, and cercospora leaf spot are among these diseases.

Resistant varieties are the only economical control practice.

References:

- (1) "The Border Method of Irrigation", C 408, University of California Extension Service.
- (2) "Controlling Alfalfa Quality", B 784, University of California Extension Service.
- (3) "Diseases of Alfalfa in California", C 485, University of California Extension Service.

SAMPLE COSTS - SANTA BARBARA COUNTY - 1966
 PRODUCE GREEN CHOP ALFALFA
 BORDER IRRIGATION - COASTAL AREA

Warren E. Bendixen
 Edward A. Yeary

Operations Cost

	Fuel & Repairs	Deprec.	Int.	Total
WT Wheel tractor 60 hp	1.36	.66	.32	2.34
ST Wheel tractor 30 hp	1.00	.40	.20	1.60
C Chopper & wagon	.94	1.59	.28	2.81

Man Labor: 1.70/hour

Yield - 36 tons green feed or 8.5 tons dry alfalfa hay equivalent

Operation	Hours/acre	Labor	Fuel & Repairs	Materials		Cost/acre	
				Kind and Amount	Cost	Sample	Your
CULTURAL COST							
Irrigation 14x	14.0	23.80		Water 4.5 ac. ft. @ \$5	22.50	46.30	
Fertilizer				P ₂ O ₅ 100 lb/ac @ .10/lb-appli. \$1	11.00	11.00	
Gopher Control				Material and application	2.00	2.00	
Repair to equip. except tractor & harvester			5.00			5.00	
Operating expenses				Office, car, oper. capital, ins., etc.	7.50	7.50	
Rent					60.00	60.00	
Taxes					10.00	10.00	
Total Cultural Cost		23.80	5.00		113.00	141.80	
HARVESTING COST							
Chop & Haul alfalfa				(Based on chopping & hauling 5 tons/hour)			
WT & C 7x	7.2	12.24	16.56			28.80	
DEPRECIATION & INTEREST							
				<u>Depreciation</u>	<u>Interest 6%</u>		
WT Wheel tractor-7.2 hr.				4.75	2.30		
C Chopper & wagon-7.2 hr.				11.45	2.02		
Irrigation System			\$160-15 yr.	10.67	4.80		
Alfalfa stand			\$63.90-3 yr.	21.30	1.92		
Buildings & other equip.			\$20-10 yr.	2.00	.60		
Total Depreciation & Interest				50.17	11.64		61.81
Total Cost							232.41
Cost per Ton							6.46

SAMPLE COSTS - SANTA BARBARA COUNTY - 1966
 PRODUCE GREEN CHOP ALFALFA
 SPRINKLER IRRIGATION - COASTAL AREA

Warren E. Bendixen
 Edward A. Yeary

Operations cost

	Fuel & Repairs	Deprec.	Int.	Total
WT Wheel tractor 60 hp	1.36	.66	.32	2.34
ST Wheel tractor 30 hp	1.00	.40	.20	1.60
C Chopper & wagon	.94	1.59	.28	2.81

Man Labor: 1.70/hour

Yield - 36 Tons green feed or 8.5 tons dry alfalfa hay equivalent

Operation	Hours/acre	Labor	Fuel & Repairs	Materials		Cost/acre	
				Kind and Amount	Cost	Sample	Your
CULTURAL COSTS							
Irrigation 14x	14.0	23.80		Water 4.0 ac. ft. @ \$6.50	26.00	49.80	
Fertilizer				P ₂ O ₅ 100 lb/ac @ .10/lb-appli. \$1	11.00	11.00	
Gopher Control				Material and application	2.00	2.00	
Repair to equip. except tractor & harvester			8.00			8.00	
Operating expenses				Office, car, oper. capital, ins., etc.	7.50	7.50	
Rent					60.00	60.00	
Taxes					10.00	10.00	
Total Cultural Cost		23.80	8.00		116.50	148.30	
HARVESTING COST							
Chop & Haul alfalfa				(Based on chopping & hauling 5 tons/hour)			
WT & C 7x	7.2	12.24	16.56			28.80	
DEPRECIATION & INTEREST							
				<u>Depreciation</u>	<u>Interest 6%</u>		
WT Wheel Tractor-7.2 hr.				4.75	2.30		
C Chopper & wagon-7.2 hr.				11.45	2.02		
Irrigation System				\$240-15 yr. 16.00	7.20		
Alfalfa Stand				\$59.59-3 yr. 19.53	1.76		
Buildings & other equip.				\$20-10 yr. 2.00	.60		
Total Depreciation & Interest				53.73	13.88	67.61	
Total Cost						244.71	
Cost per Ton						6.80	

GREEN CHOP ALFALFA PROFITS AS AFFECTED BY YIELD & PRICE

Border Irrigation

Yield: Tons/acre	Sample Production Costs per Acre	Value of Green Chopped Alfalfa Per Ton				
		\$5.00	\$6.00	\$7.00	\$8.00	\$9.00
32	226.93	- 66.93	- 34.93	- 2.93	+29.07	+61.07
34	229.67	- 59.67	- 25.67	+ 8.33	42.33	76.33
36	232.41	- 52.41	- 16.41	19.59	55.59	91.59
38	235.15	- 45.15	- 7.15	30.85	68.85	106.85
40	237.89	- 37.89	+ 2.11	42.11	82.11	122.11
42	240.63	- 30.63	11.37	53.37	95.37	137.37
44	243.37	- 23.37	20.63	64.63	108.63	152.63

Sprinkler Irrigation

Yield: Tons/acre	Sample Production Costs per Acre	Value of Green Chopped Alfalfa Per Ton				
		\$5.00	\$6.00	\$7.00	\$8.00	\$9.00
32	239.23	- 79.23	- 47.23	- 15.23	+16.77	+48.77
34	241.97	- 71.97	- 37.97	- 3.97	30.03	64.03
36	244.71	- 64.71	- 28.71	+ 8.29	43.29	79.29
38	247.45	- 57.45	- 19.45	18.55	56.55	94.55
40	230.19	- 50.19	- 10.19	29.81	69.81	109.81
42	252.93	- 42.93	- 3.93	41.07	83.07	125.07
44	254.67	- 35.67	+ 8.33	52.33	96.33	140.33

GREEN CHOP VALUE

Comparative values of green chop alfalfa and baled hay are given in the following table. The moisture content of both the baled hay and the green chop alfalfa must be evaluated in determining values.

The moisture content of recently baled hay may be as high as 18%, while hay that is in a stack dries down to about 10%.

The moisture content of green chop also varies. Alfalfa cut before 10% bloom is higher in moisture than alfalfa cut at 10% bloom.

Alfalfa in the spring has a higher % moisture than alfalfa cut in the summer or fall.

The moisture content of green chop usually varies between 78 and 82% moisture, when harvested in this area at 10% bloom stage.

COMPARATIVE VALUES OF GREEN CHOPPED ALFALFA TO BALED ALFALFA HAY⁽¹⁾

Green chop moisture content	Green chop dry matter content	Ratio of green chop to baled hay	Green chop value per each \$1/ton baled hay	Baled hay cost/ton					
				\$28	\$30	\$32	\$34	\$36	\$40
%	%		¢/ton	green chop value - \$/ton					
75	25	3.60	27.8	7.78	8.34	8.90	9.45	10.00	11.12
76	24	3.75	26.7	7.48	8.01	8.54	9.08	9.61	10.68
77	23	3.91	25.6	7.17	7.68	8.19	8.70	9.22	10.24
78	22	4.09	24.4	6.83	7.32	7.81	8.30	8.78	9.76
79	21	4.29	23.3	6.52	6.99	7.46	7.92	8.39	9.32
80	20	4.50	22.2	6.22	6.66	7.10	7.55	7.99	8.88
81	19	4.74	21.1	5.91	6.33	6.75	7.17	7.60	8.44
82	18	5.00	20.0	5.60	6.00	6.40	6.80	7.20	8.00

(1) Baled hay with 10% moisture, based on dry matter relationship only. Green chop in this area frequently has higher protein and nutritive (TDN) value.

Example: If the moisture content of the green chop is 79% and baled hay costs \$30 per ton, the green chop would be valued at \$6.99. If production costs were similar to the sample production cost, the profit per acre would be approximately \$19.59 on border irrigation and \$8.29 on sprinkler irrigation.

ALFALFA ACREAGE, PRODUCTION, AND VALUE IN SANTA BARBARA COUNTY

Year	Acreage	Production	Value
		tons	\$
1947	4,095	28,618	744,068
1948	4,632	33,213	996,390
1949	4,991	34,937	873,425
1950	5,440	36,930	981,350
1951	3,961	30,690	994,516
1952	4,801	35,949	1,025,990
1953	5,510	40,799	979,176
1954	5,711	40,298	973,052
1955	7,026	53,767	1,523,458
1956	6,730	44,972	1,124,300
1957	6,783	43,124	1,050,712
1958	7,249	54,774	1,369,375
1959	8,774	67,693	1,895,404
1960	10,152	80,547	2,416,400
1961	11,400	99,000	2,376,000
1962	12,522	107,723	2,693,000
1963	11,500	94,300	2,829,000
1964	11,300	90,400	2,441,000
1965	10,200	82,600	2,148,000

Reference:

Agricultural Crop Reports, Department of Agriculture, Santa Barbara County, California

11-15-66/250c