

ALFALFA

PRODUCTION & COSTS

CUYAMA AREA

SANTA BARBARA COUNTY

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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 fine, firm and moist 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 September or March. Fall planting produces a higher yield the first year. Winter annual grasses are more of a problem in the fall plantings.

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 - 1967
 ESTABLISH AN ALFALFA STAND
 BORDER IRRIGATION - CUYAMA

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Operations Cost

Operation	Hours/acre	Labor	Fuel & Repairs	Materials		Cost	Cost/acre	
				Kind and Amount			Sample	Your
CULTURAL COST								
Subsoil	CT 2.00	3.00	6.50					9.50
Disk 2 x	CT .67	1.00	2.17					3.17
Plow	CT .67	1.00	2.17					3.17
Sprinkle	1.00	1.50		Elec. power @ 7.50/ac ft - 8" water		5.00		6.50
Sprinkler system rental						6.50		6.50
Disk	CT .33	.50	1.08					1.58
Land plane 2 x	CT 1.00	1.50	3.25					4.75
Stake borders	.25	.38						.38
Border disk	WT .10	.15	.11					.26
Grade borders	1.00	1.50	.75	(motor grader)				2.25
Level between borders	CT .33	.50	1.08					1.58
Plant alfalfa	WT .10	.15	.11	Seed 30 lbs @ 50¢/lb		15.00		15.26
Sprinkle	1.00	1.50		Elec. power @ 7.50/ac ft - 6" water		3.75		5.25
Operating Costs				Office, car, oper. capital, ins., etc.		3.60		3.60
Repairs to other equip.			1.50					1.50
Total Cultural Cost	8.45	12.68	18.72			33.85		65.25
DEPRECIATION & INTEREST								
				<u>Depreciation</u>		<u>Interest 6%</u>		
				CT Crawler tractor	5.00	1.75		
				WT Wheel tractor	.10	.04		
				Other equipment	1.37	.41		
Total Depreciation & Interest					6.47	2.20		8.67
Total Cost								73.92

SAMPLE COSTS - SANTA BARBARA COUNTY - 1967
 ESTABLISH AN ALFALFA STAND
 SPRINKLER IRRIGATION - CUYAMA

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Operations Cost

				Fuel & Repairs	Deprec.	Int.	Total
		CT Crawler tractor 60 hp diesel		3.25	1.00	.35	4.60
Man Labor: 1.50/hour		WT Wheel tractor 40 hp diesel		1.10	.60	.25	1.95
Operation	Hours/acre	Labor	Fuel & Repairs	Materials		Cost/acre	
				Kind and Amount	Cost	Sample	Your
CULTURAL COST							
Subsoil	CT 2.00	3.00	6.50				9.50
Disk 2 x	CT .67	1.00	2.17				3.17
Plow	CT .67	1.00	2.17				3.17
Sprinkle	1.00	1.50		Elec. power @ 7.50/ac ft - 8" water	5.00		6.50
Disk	CT .33	.50	1.08				1.58
Landplane 2 x	CT 1.00	1.50	3.25				4.75
Plant alfalfa	WT .10	.15	.11	Seed - 30 lbs @ 50¢/lb	15.00		15.26
Sprinkle	1.00	1.50		Elec. power @ 7.50/ac ft - 6"	3.75		5.25
Operating costs				Office, car, oper. capital, ins., etc.	3.00		3.00
Repairs to other equip.			1.50				1.50
Total Cultural Cost	6.77	10.15	16.78		26.75		53.68
DEPRECIATION & INTEREST				Depreciation	Interest 6%		
			CT Crawler tractor	4.67	1.63		
			WT Wheel tractor	.05	.02		
			Other equipment	1.08	.32		
Total Depreciation & Interest				5.80	1.97		7.77
Total Cost							61.45

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 the seed with the proper Rhizobium strain 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 selection, preparation, and irrigation practices are good weed preventive measures.

Planting certified or other high quality seed prevents planting weed seeds.

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

ALFALFA PRODUCTION

Alfalfa, the predominate crop, is well adapted to Cuyama Valley. Alfalfa is almost completely mechanized and has a low labor requirement.

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, mature alfalfa roots use moisture from depths to 12' or more.

Winter and spring irrigations can recharge the soil moisture to field capacity to a depth of 8-12 feet. These irrigations frequently increase yields by avoiding severe moisture stress during the summer.

As a general rule, border irrigation is more economical on fine textured soils, whereas on sandier soils sprinkler irrigation may be the most economical.

The amount of irrigation water indicated in this publication includes an additional 15-20% leaching requirement. The extra water being necessary for removing (leaching) the salts added to the soil in previous irrigations.

Border Irrigation

Water application efficiency up to 70% may be obtained. Approximately 72 to 90 acre inches of water per year are applied with border irrigation.

Yields are lower in the area of the borders and these fields may produce lower yields than sprinkler irrigations.

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 60 to 72 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. Compare yields 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. P₂O₅) annually.

On phosphorus deficient soils, a heavy application, 100-150 lbs. of P/acre (230-345 lbs. P₂O₅) 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 application of 35-45 lbs. of P/acre (80-104 lbs. P₂O₅) can be used.

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

Potassium. Available potassium occurs in sufficient amounts in most soils in this area for maximum yields. If deficiencies occur, they can be corrected with an application of 80 to 150 lbs. of K/acre (96-180 lbs. K₂O).

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. If 10% of the stems are in bloom it is time to cut.

Another 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. In the spring, few blooms occur. Also, lygus bugs may blast the flowers during the summer.

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

When the 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% stage.

WEED CONTROL

Winter annual grasses are the major weed problems in Cuyama. Weedy fields can be economically controlled with herbicides.

Higher yields, higher quality hay and a premium selling price are the advantages of weed control.

Check the current University of California weed control bulletin for recommendations.

GOPHER CONTROL

Gophers are easily and economically controlled with gopher bait applications.

SPOTTED ALFALFA APHID

The spotted alfalfa aphid is one of the most damaging pests to alfalfa in this area.

Resistant varieties are the most effective means of controlling this aphid. Replacing susceptible varieties with resistant varieties will reduce spraying costs and aphid damage.

Check the current University of California pest and disease control bulletin for chemical control practices.

CLOVER ROOT CURCULIO

The clover root curculio is widely distributed throughout Cuyama Valley.

The larvae stage of this insect feeds on alfalfa and clover roots, making numerous holes and burrows, often girdling the small roots. In Cuyama, most of the larvae damage occurs in March, April, and May.

The adults are small (1/6" long), grayish or brownish beetles with blunt short snouts. The adult can be distinguished by its smaller size and the broader snout.

The larvae are about 1/6" long, grayish-white, footless, brown-headed grubs.

At the present time, crop rotation is the only means of control.

BACTERIAL WILT DISEASE

Bacterial wilt, a severe disease in this area

shortens the life of the alfalfa stand.

The first symptom is a stunting of the infected plants. Then the leaves turn yellow.

A yellowish-brown discoloration of the central woody cylinder develops in the roots and crowns. Discoloration may also be seen by peeling the bark for the woody cylinder.

The use of wilt-resistant varieties is recommended for control.

FOLIAGE DISEASES

Fungus diseases may damage the foliage in the spring and fall. Downy mildew, common leaf spot, stemphylium leaf spot, and cercospora leaf spot are among these diseases.

Resistant varieties (Caliverde 65) are the only economical control practices.

SELLING BALED ALFALFA

Baled hay usually loses moisture during storage. This shrinkage factor is important to consider when selling or buying alfalfa hay.

How much actual moisture may be lost varies with the moisture content of the hay at baling time and the length of time in storage. The higher the moisture content when baled, the greater the shrinkage for the same period of time.

SAMPLE COSTS - SANTA BARBARA COUNTY - 1967
 PRODUCE ALFALFA HAY
 BORDER IRRIGATION - CUYAMA

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		Operations Cost				
			Fuel & Repairs	Deprec.	Int.	Total
Based on:	Alfalfa Stand - 6 years	WT Wheel Tractor 40 hp diesel	1.10	.60	.25	1.95
Man Labor:	1.50/hour	S Swather	3.00	2.10	.48	5.58
Yield:	9 tons/acre/6 years	B Baler (3 wire)	3.60	1.15	.38	5.13
		H Harobed	2.00	1.90	.60	4.50

Operation	Hours/acre	Labor	Fuel & Repairs	Materials		Cost/acre	
				Kind and Amount	Cost	Sample	Your
CULTURAL COST							
Irrigation 14 x	10.0	15.00		Electrical power 7 ac ft @ 6.50	45.50	60.50	
Weed control (Every 6th year)				Applic. 1.50/ac Diuron 1½ lbs @ 4.50 (1/6 cost per year)	1.00	1.00	
Burn the Borders (every 2nd yr)				Fuel 1.50/ac, burning 34¢/ac (1/2 cost per year)	.92	.92	
Miscellaneous	WT 1.0	1.50	1.10	Misc. materials	.65	3.25	
Irrigation, equip, repairs					10.00	10.00	
Operating Costs				Office, car, oper. capital, ins., etc.	10.75	10.75	
Taxes					5.80	5.80	
Total Cultural Cost	11.0	16.50	1.10		74.62	92.22	
HARVESTING COST							
Swathing 6 x	S 1.5	2.25	4.50			6.75	
Rake	WT 1.0	1.50	1.10			2.60	
Baler (9 T/hr)	WT 1.0	1.50	4.70	Wire @ 80¢/ton hay	7.20	13.40	
Roadside stack	H 1.0	1.50	2.00			3.50	
Total Harvest Cost	4.5	6.75	12.30		7.20	26.25	
DEPRECIATION & INTEREST							
				<u>Depreciation</u>	<u>Interest 6%</u>		
			Equipment	8.05	2.49		
			Alfalfa Stand	12.31	2.22		
			Irrigation System	6.67	3.00		
			Pumps and Wells	7.00	3.15		
			Buildings & Tools	1.00	.60		
			Land (\$450)	-	27.00		
Total Depreciation & Interest				35.03	38.46		73.49
Total Cost of Production							191.96
Cost per Ton							21.33
Insect Control if needed - \$4.50/acre/application							

SAMPLE COSTS - SANTA BARBARA COUNTY - 1967
 PRODUCE ALFALFA HAY
 SPRINKLER IRRIGATION - CUYAMA

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Operations Cost

		Fuel & Repairs	Deprec.	Int.	Total
Based on: Alfalfa Stand - 6 years	WT Wheel Tractor 40 hp diesel	1.10	.60	.25	1.95
Man Labor: 1.50/hour	S Swather	3.00	2.10	.48	5.58
Yield: 9 tons/acre/6 years	B Baler (3 wire)	3.60	1.15	.38	5.13
	H Harobed	2.00	1.90	.60	4.50

Operation	Hours/acre	Labor	Fuel & Repairs	Materials		Cost/acre	
				Kind and Amount	Cost	Sample	Your
CULTURAL COST							
Irrigate 14 x	14.00	21.00		Electrical power 5 1/3 ac ft @ 7.50	40.00	61.00	
Weed Control (Every 6th year)				Applic. 1.50/ac Diuron 1 1/2 lbs @ 4.50 (1/6 cost per year)	1.00	1.00	
Miscellaneous WT	1.00	1.50	1.10	Misc. materials	.65	3.25	
Irrigation, equip, repairs					10.00	10.00	
Operating Costs				Office, car, oper. capital, ins., etc.	10.80	10.80	
Taxes					5.80	5.80	
Total Cultural Cost	15.00	22.50	1.10		68.25	91.85	
HARVESTING COST							
Swathing 6x	S 1.50	2.25	4.50			6.75	
Rake	WT 1.00	1.50	1.10			2.60	
Baler (9 T/hr)	WT 1.00	1.50	4.70	Wire @ 80¢/ton hay	7.20	13.40	
Roadside Stack	H 1.00	1.50	2.00			3.50	
Total Harvest Cost	4.50	6.75	12.30		7.20	26.25	
DEPRECIATION & INTEREST							
				Depreciation	Interest 6%		
			Equipment	8.05	2.49		
			Alfalfa Stand	10.24	1.84		
			Irrigation System	11.67	5.25		
			Pumps & Wells	7.00	3.15		
			Buildings & Tools	1.00	.60		
			Land (\$450)	-	27.00		
Total Depreciation & Interest				37.96	40.33		78.29
Total Cost of Production							196.39
Total Cost per Ton							21.82
Insect Control if needed - \$4.50/acre/application							

TABLE 5

HOW MUCH PROFIT PER ACRE?

BORDER IRRIGATION

Stand Life	Yield - Tons/acre Per Year	Production Costs Per acre	Selling Price of Hay per Ton				
			\$22.00	\$24.00	\$26.00	\$28.00	\$30.00
<u>3-Yr. Stand</u>			profits - \$				
1st year	8	\$200.96	-24.96	- 8.96	+ 7.04	+23.04	+39.04
2nd year	9	204.26	- 6.26	+11.74	29.74	47.74	65.74
3rd year	7	197.66	-43.66	-29.66	-15.66	- 1.66	12.34
Total	24		-74.88	-26.88	+21.12	+69.12	+117.12
3 yr. average	8		-24.96	- 8.96	+ 7.04	+23.04	+ 39.04
<u>4-Yr. Stand</u>			profits - \$				
1st year	8	194.81	-18.81	- 2.81	+13.19	+29.19	+45.19
2nd year	9	198.11	- 0.11	+17.89	35.89	53.89	71.89
3rd year	9	198.11	- 0.11	17.89	35.89	53.89	71.89
4th year	7	191.51	-37.51	-23.51	- 9.51	4.49	18.49
Total	33		-56.54	+ 9.46	+75.46	+141.46	+207.46
4-yr. average	8 1/4		-14.14	+ 2.37	+18.87	+ 35.37	+ 51.87
<u>6-Yr. Stand</u>			profits - \$				
1st year	8	188.66	-12.66	+ 3.34	+19.34	+35.34	+51.34
2nd year	9	191.96	+ 6.04	24.04	42.04	60.04	78.04
3rd year	9	191.96	6.04	24.04	42.04	60.04	78.04
4th year	9	191.96	6.04	24.04	42.04	60.04	78.04
5th year	8	188.66	-12.66	3.34	19.34	35.34	51.34
6th year	7	185.36	-31.36	-17.36	- 3.36	10.64	24.64
Total	50		-38.56	+61.44	+161.44	+261.44	+361.44
6-yr. average	8 1/3		- 6.43	+10.24	+ 26.91	+ 43.57	+ 60.24
<u>8-Yr. Stand</u>			profits - \$				
1st year	8	185.58	- 9.36	+ 6.64	+22.64	+38.64	+54.64
2nd year	9	188.88	+ 9.12	27.12	45.12	63.12	81.12
3rd year	9	188.88	9.12	27.12	45.12	63.12	81.12
4th year	9	188.88	9.12	27.12	45.12	63.12	81.12
5th year	9	188.88	9.12	27.12	45.12	63.12	81.12
6th year	9	188.88	9.12	27.12	45.12	63.12	81.12
7th year	8	185.58	- 9.36	6.64	22.64	38.64	54.64
8th year	7	182.28	-28.28	-14.28	- 0.28	13.72	27.72
Total	68		- 1.40	+134.60	+270.60	+406.60	+542.60
8-yr. average	8 1/2		- 0.18	+ 16.83	+ 33.83	+ 50.83	+ 67.83

TABLE 6

HOW MUCH PROFIT PER ACRE?

SPRINKLER IRRIGATION

Stand Life	Yield - Tons/acre Per Year	Production Costs Per acre	Selling Price of Hay per Ton				
			\$22.00	\$24.00	\$26.00	\$28.00	\$30.00
<u>3-Yr. Stand</u>			profits - \$				
1st year	8	\$203.32	-27.32	-11.32	+ 4.68	+26.68	+36.68
2nd year	9	206.62	- 8.62	+ 9.38	27.38	45.38	63.38
3rd year	7	200.02	-46.02	-32.02	-18.02	- 4.02	9.98
Total	24		-81.96	-33.96	+14.04	+68.04	+110.04
3 yr. average	8		-27.32	-11.32	+ 4.68	+22.68	+ 36.68
<u>4-Yr. Stand</u>			profits - \$				
1st year	8	198.20	-22.20	- 6.20	+ 9.80	+25.80	+41.80
2nd year	9	201.50	- 3.50	+14.50	32.50	50.50	68.50
3rd year	9	201.50	- 3.50	14.50	32.50	50.50	68.50
4th year	7	194.90	-40.90	-26.90	-12.90	1.10	15.10
Total	33		-70.10	- 4.10	+61.90	+127.90	+193.90
4-yr. average	8 1/4		-17.53	- 1.03	+15.48	+ 31.98	+ 48.48
<u>6-Yr. Stand</u>			profits - \$				
1st year	8	193.09	-17.09	- 1.09	+14.91	+30.91	+46.91
2nd year	9	196.39	+ 1.61	+19.61	37.61	55.61	73.61
3rd year	9	196.39	1.61	19.61	37.61	55.61	73.61
4th year	9	196.39	1.61	19.61	37.61	55.61	73.61
5th year	8	193.09	-17.09	- 1.09	14.91	30.91	46.91
6th year	7	189.79	-35.79	-21.79	- 7.79	6.21	20.21
Total	50		-65.14	+34.68	+134.86	+234.86	+334.68
6-yr. average	8 1/3		-10.86	+ 5.78	+ 22.48	+ 39.14	+ 55.78
<u>8-Yr. Stand</u>			profits - \$				
1st year	8	190.53	-14.53	+ 1.47	+17.47	+33.47	+49.47
2nd year	9	193.83	+ 4.17	22.17	40.17	58.17	76.17
3rd year	9	193.83	4.17	22.17	40.17	58.17	76.17
4th year	9	193.83	4.17	22.17	40.17	58.17	76.17
5th year	9	193.83	4.17	22.17	40.17	58.17	76.17
6th year	9	193.83	4.17	22.17	40.17	58.17	76.17
7th year	8	190.53	-14.53	+ 1.47	17.47	33.47	49.47
8th year	7	187.23	-33.23	-19.23	- 5.23	8.77	22.77
Total	68		-41.44	+94.56	+230.56	+366.56	+502.56
8-yr. average	8 1/2		- 5.18	+11.82	+ 28.82	+ 45.82	+ 62.82

PRODUCTION COSTS

High cost of establishing and producing alfalfa stresses the need of high yields and long stand life.

The duration of the stands effect on profits is shown on tables 5 and 6.

Long stand life increases production efficiency.

Sample production costs for a 3-year stand (border irrigation) show an average annual profit of \$7.04 (\$26/ton) compared to \$26.91 for a 6-year stand.

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

ALFALFA ACREAGE, PRODUCTION, AND VALUE IN SANTA BARBARA COUNTY

Year	Acreege	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

Co-operative Extension Work in Agriculture and Home Economics, U. S. Department of Agriculture, University of California, and County of Santa Barbara Co-operating.

3/6/67:200c.