

ALFALFA

PRODUCTION & COSTS

Coastal Area
Santa Barbara County

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ALFALFA

PRODUCTION & COSTS

Alfalfa is the most important forage crop in Santa Barbara County. It is grown throughout the county on a wide range of climatic conditions and soil types.

Alfalfa is a long-lived, perennial legume. It has a tap root system that can reach depths of over 20 feet in good soils. The new stems develop from crown buds located near the soil surface.

Near the coast, the alfalfa is principally green-chopped and fed directly to dairy or beef animals. In the inland areas around Santa Ynez, Los Alamos, and Sisquoc, alfalfa can be cured for baling.

Cuyama Valley produces both baled and cubed alfalfa.

Yields of alfalfa have increased in recent years due to improved varieties and better irrigation, fertilization, and harvest practices.

Good management to produce high yields is important for economical alfalfa production. An extra ton per acre of alfalfa can mean nearly three times as much profit.

Frequently, the factors affecting yields may not be different practices, but just doing the right thing at the right time.

Alfalfa is grown in rotation with silage corn, beans, sugar beets, and cereal crops.

STAND ESTABLISHMENT

The cost of establishing a stand of alfalfa is high. Every precaution should be taken to get a good stand of rapidly growing alfalfa.

The seed bed should be mellow, yet firm enough so the soil particles are in close contact with the seed. Avoid over-compaction and wheel tracks.

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.

Alfalfa is capable of producing nitrogen from the air through nitrogen-fixing bacteria in nodules formed on the roots. This bacteria may be present in the soil, however, the cost of inoculating the seed is so

small that it is a good practice to inoculate to insure the presence of these organisms.

Planting rates vary from 20-30 lbs. of seed per acre. The rate of seed to plant varies with the quality of seed, seedbed, soil moisture, and method of planting.

There are approximately 220,000 alfalfa seeds per pound or 5 seeds per square foot when planted at one pound per acre. Twenty pounds of seed provides 100 seeds per square foot. A good stand of alfalfa, when established, has between 14-20 plants per square foot.

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

PRODUCTION MANAGEMENT

Dense, healthy stands are the result of good management practices. The alfalfa plants must produce and store sufficient plant food in their roots and crowns to provide for regrowth after cutting. If the plants are cut before 10% bloom, they are not able to store adequate plant food.

Remove the cut alfalfa from the field as soon as possible. The longer the delay, the more damage is done to the regrowth by the alfalfa windrows and bales.

Reduce wheel traffic over the alfalfa to a minimum. The wheels damage the regrowth and crowns of the alfalfa and make them more susceptible to diseases.

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 $\frac{3}{4}$ " 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.

METHODS OF HARVESTING

Methods and equipment used in harvesting alfalfa continue to change. Good management in handling the alfalfa at harvest time is important in producing a high quality product.

Green Chopping

Most of the alfalfa in this area is green chopped. This method of harvesting allows the grower to produce a high quality feed with a minimum loss of protein and carotene.

The quick removal of forage allows fast alfalfa regrowth.

Growers are using two methods of harvesting alfalfa as green chop. The standing alfalfa can be direct-cut, chopped and blown directly into wagons for feeding to the livestock.

Some growers prefer feeding wilted alfalfa. With this method, the standing alfalfa is cut with a swather, wilted, and then chopped with a wind-row pickup chopper and blown into a wagon.

Baled Hay

Baled hay is produced in the drier, inland areas of Santa Barbara County. The alfalfa is swathed, baled, and roadside stacked for marketing.

The quality of baled hay varies widely, depending on the curing conditions and the moisture content at the time of baling. When baling, the stems must be dry enough to prevent spoilage, but have sufficient moisture so the leaves are not lost. Hay intended for baling should contain around 16-18% moisture.

Remove the alfalfa from the fields as soon as possible to prevent damage to the new alfalfa growth.

Cubed Alfalfa

Most of the alfalfa in the Cuyama Valley is harvested as cubes instead of baling. Cubes have an advantage in mechanized handling, feeding, and storage. Harvesting costs are greater for cubed hay.

Agricultural Extension
Santa Barbara County

ESTABLISH an ALFALFA STAND

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Sprinkler Irrigation - Coastal Area
1974 - Cost Analysis Work Sheet

		Operating Costs/hour						
				Fuel & Repairs	Deprec.	Interest	Total	
Equipment Operator - \$3.83* Per hr. total				CT-Crawler Tractor 80 hp	\$6.55	\$2.60	\$1.98	\$11.13
Other Labor - \$2.98* Per hr. total				WT-Wheel tractor 60 hp	2.70	1.60	.80	5.10
				SWT-Wheel Tractor 40 hp	2.10	1.45	.72	4.27

Operation	Tractor	Acres /hour	Hours /acre	Labor	Fuel & Repairs	Materials		Cost/Acre	
						Kind and Amount	Costs	Sample	Yours
<u>Cultural Costs</u>		Ac.	Hr.	\$	\$		\$	\$	
Disc 3x	CT	1.25	.75	2.87	4.91			7.78	
Flow	WT	1.25	.75	2.87	2.02			4.89	
Landplane	CT	2.00	.50	1.92	3.28			5.20	
Fertilize-custom						100 lbs P ₂ O ₅ + Applic. \$4	34.00	34.00	
Plant	SWT	4.00	.25	.96	2.02	Seed-30 lbs @ \$1.20/lb.	36.00	38.98	
Ring roll	SWT	4.00	.25	.96	2.02			2.98	
Sprinkler 3x		.60	1.67	4.98		Water - .5 ac. ft. @ \$9	4.50	9.48	
Repairs to equipment					7.00			7.00	
<u>Total Cultural Costs</u>			4.17	\$14.56	\$21.25		\$74.50	\$110.31	
<u>Business & Miscellaneous Costs</u>		6% of cultural costs						6.62	
<u>Depreciation & Interest</u>						<u>Depreciation</u>	<u>Interest - 8%</u>		
		CT-tractor 1.25 hrs.		\$ 3.25	\$ 2.48				
		WT-tractor .75 hrs.		1.20	.60				
		SWT-tractor .50 hrs.		.73	.36				
Stand establishment share other equipment (\$30 - 10 years)				3.00	1.20				
<u>Total Depreciation & Interest</u>				\$ 8.18	\$ 4.64			\$ 12.82	
<u>Total Cost to Establish Stand</u>								\$129.75	

*Social Security, Workman's Compensation included.

Agricultural Extension
Santa Barbara County

GREEN CHOP ALFALFA

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Sprinkler Irrigation - Coastal Area
1974 - Coast Analysis Work Sheet

ALFALFA YIELD - 36 green tons or
8.5 dry tons/acre

Equipment Operator - \$3.83* per hr. total
Other Labor - 2.98* per hr. total

Operating Costs/hour

	Fuel & Repairs	Deprec.	Interest	Total
SWT-tractor 40 hp	\$ 2.10	\$1.45	\$.72	\$ 4.27
SPC-chopper & wagon	11.05	5.09	2.55	18.69
S-swather	3.85	3.00	1.50	8.35

Operation	Trac- tor	Acres /hour	Hours /acre	Labor \$	Fuel & Repairs \$	Materials		Cost/Acre	
						Kind and Amount	Costs \$	Sample	Yours
Cultural Costs									
Irrigate 14x		.07	14.00	41.72	7.75	Water - 4 ac. ft. @ \$9	36.00		85.47
Fertilizer						P ₂ O ₅ - 100 lbs + Applic. \$1.50	31.50		31.50
Gopher control bait, machine	SWT	5.00	.20	.77	.42	Poison grain - \$1.60/acre	1.60		2.79
Repairs to Equipment					1.00				1.00
Total Cultural Costs			14.20	\$42.49	\$ 9.17		\$69.10		\$120.76
Harvesting Costs									
Cut & Windrow 7x	S	.57	1.75	6.70	6.75				13.45
Chop into Wagon 7x	SPC	.36	2.80	10.72	30.94				41.66
Total Harvesting Costs			4.55	\$17.42	\$37.69				\$ 55.11
Rent (total)									125.00
Business & Miscellaneous Costs						6% of cultural, harvest costs & rent			18.05
Depreciation & Interest									
						<u>Depreciation</u>	<u>Interest - 8%</u>		
						SWT-tractor - .2 hr	\$.29	\$.14	
						SPC-chopper & wagon-2.8 hr.	14.25	7.14	
						S-Swather- 1.75 hr.	5.25	2.63	
						Alfalfa Stand (\$129.75 cost-3 yrs.)	43.25	5.19	
						Irrigation, other equip. (\$260 - 15 yrs.)	17.33	10.40	
Total Depreciation & Interest							\$80.37	\$25.50	\$105.87
Total Cost Per Acre									\$424.79
Cost Per Green Ton									11.80

*Social Security, Workman's Compensation included.

COMPARATIVE VALUES OF GREEN CHOP AND BALED HAY

The value of alfalfa is relative to the moisture content. The moisture content of both baled hay and green chop alfalfa varies and must be evaluated in determining the comparative value.

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

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%.

Alfalfa that is cut and left in the windrow for a day before chopping and feeding as wilted alfalfa may contain only 60% moisture.

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

The following table lists comparative values of green chopped alfalfa with relation to baled hay. Example: If the moisture content of the green chop is 80% and baled hay costs \$75 per ton, the green chop would be valued at \$16.65.

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

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 (10% M)	Green Chop Value Per Each \$1/Ton Baled Hay	Baled Alfalfa Hay - Cost/Ton						
				\$50	\$55	\$60	\$65	\$70	\$75	\$80
%	%		c/ton	green chop value - \$/ton						
50	40	2.25	44.4	22.20	24.42	26.64	28.86	31.08	33.30	35.52
62	38	2.37	42.0	21.00	23.10	25.20	27.30	29.40	31.50	33.60
64	36	2.50	40.0	20.00	22.00	24.00	26.00	28.00	30.00	32.00
66	34	2.65	37.7	18.85	20.74	22.62	24.51	26.39	28.28	30.16
68	32	2.81	35.6	17.80	19.50	21.36	23.14	24.92	26.70	28.48
70	30	3.00	33.3	16.65	18.32	19.98	21.65	23.31	24.98	26.64
71	29	3.10	32.3	16.15	17.77	19.38	21.00	22.61	24.23	25.84
72	28	3.21	31.2	15.60	17.16	18.72	20.28	21.84	23.40	24.96
73	27	3.33	30.0	15.00	16.50	18.00	19.50	21.00	22.50	24.00
74	26	3.46	28.9	14.45	15.90	17.34	18.79	20.23	21.68	23.12
75	25	3.60	27.8	13.90	15.29	16.68	18.07	19.46	20.85	22.24
76	24	3.75	26.7	13.35	14.69	16.02	17.36	18.69	20.03	21.36
77	23	3.91	25.6	12.80	14.08	15.36	16.64	17.92	19.20	20.48
78	22	4.09	24.4	12.20	13.42	14.64	15.86	17.08	18.30	19.52
79	21	4.29	23.3	11.65	12.82	13.98	15.15	16.31	17.48	18.64
80	20	4.50	22.2	11.10	12.21	13.32	14.43	15.54	16.65	17.76
81	19	4.74	21.1	10.55	11.61	12.66	13.72	14.77	15.83	16.88
82	18	5.00	20.0	10.00	11.00	12.00	13.00	14.00	15.00	16.00

^{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 than baled hay from other areas.

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.

Phosphorus is a plant nutrient most likely to be deficient in alfalfa in Santa Barbara County. A yield of 8.5 tons/acre removes 80 to 104 lbs. P_2O_5 .

On phosphorus deficient soils, a heavy application, 230-345 lbs. P_2O_5 /acre will last for 3-4 years. Heavy applications result in deeper

movement of the phosphorus in the soil; better phosphorus uptake by the alfalfa; and saves application costs. Annual applications of 80-104 lbs. P_2O_5 /acre 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 96-180 lbs. K_2O /acre.

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.

Nitrogen

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

IRRIGATION

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

Adequate soil moisture must be available throughout the growing season for maximum production. Irrigation schedules should be adapted to the needs of the alfalfa. Seedling alfalfa, established alfalfa, season of the year, and the soil texture change the amount and the frequency of irrigations.

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

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

Irrigation practices are important in maintaining a stand of alfalfa. Schedule the irrigations so that there is adequate moisture throughout the growing season.

Usually one or two irrigations of 3 to 4 acre inches per cutting is sufficient. Excess moisture reduces aeration and may cause a shallow root system and promote development of root diseases.

Alfalfa in this area is irrigated by border or sprinkler irrigation systems.

INSECTS

Many insects are found in alfalfa fields. Most of these are beneficial insects, while others are harmful.

Egyptian alfalfa weevil, spotted alfalfa aphid, and pea aphid are the three most damaging insects in this area.

Egyptian Alfalfa Weevil

The Egyptian alfalfa weevil is a pest in this area during March and April.

The larvae of this insect do the greatest amount of damage. They feed on the growing tips, the leaves and buds of the alfalfa plant. Damaged leaves dry rapidly and the field appears gray or white.

High larval populations retard new plant growth and may seriously damage the next cutting.

NEMATODES

There are several nematodes which damage alfalfa plants in this area. The alfalfa stem nematode and the root knot nematode are the most severe problems. Crop rotation and resistant or tolerant varieties are the only economical means of control.

Alfalfa Stem Nematode

The alfalfa stem nematode is one of the most damaging pests of 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.

Spotted Alfalfa Aphid

The spotted alfalfa aphid damages the alfalfa by sucking juice from the leaves and stems. In addition to the sucking effect, the aphids inject a poison into the plants. This poison quickly kills seedling plants and stunts or retards growth of older plants of susceptible varieties. A high infestation of spotted alfalfa aphids, if not controlled, can kill an established stand of non-resistant alfalfa varieties.

Pea Aphid

The adult pea aphid is larger than the spotted alfalfa aphid. This insect is bright green in color and about 1/6" long.

The pea aphid damages the alfalfa by sucking the juice from the leaves and stems. Severe infestations will cause stunting and may even kill the plants.

The infected plants have short internodes and swollen stems. Severely damaged plants have short, clublike growth. Yields are severely reduced and alfalfa stands killed in 2-4 years by this pest.

The nematode is spread by harvesting equipment moving infected plants and by irrigation water.

Root-Knot Nematode

The root-knot nematode attacks the alfalfa roots forming galls or a swelling of the root area. This nematode is more severe in coarse textured, sandy soils.

DISEASES

Several diseases affect alfalfa plants in this area. Resistant varieties and good irrigation management practices can reduce hazards of these diseases.

Bacterial Wilt

Bacterial wilt is a severe disease in this area and throughout the United States. Alfalfa plants may be killed in 2-4 years by this bacterial disease. Alfalfa is the only host of this organism. Water and farm implements may spread the disease.

The symptoms of this disease are a stunting of the plant and yellowing of the leaves. The roots have yellow-brown streaks on the woody part under the bark. The symptoms of this disease occur more often during winter and spring. The use of wilt resistant varieties is recommended for control.

Phytophthora Root Rot

This disease is caused by a water mold fungus which develops under wet soil conditions. The disease is spread by water and the movement of soil. The symptoms of this disease are a yellowing and dropping

of the leaves. The plants wilt and die. A cross section of the roots show a reddish-brown to yellow-tan color. Good irrigation management is the best control practice. Do not over-water or leave water standing for long periods of time.

Downy Mildew

This fungus disease is usually a problem in the spring or during cool, moist periods. The infected leaves become light green or yellow. A fine, white, cotton or powdery growth occurs on the lower surface of the leaves.

Resistant varieties are the only economical control practice.

Leaf Spot Diseases

The cool, moist climatic condition in this area allows these fungus leaf spot diseases to become severe problems. Common leaf spot, Stem-phylum leaf spot, and Cercospora leaf spot all affect the alfalfa in this area. Alfalfa yields are reduced from the dropping of the leaves caused by these fungus diseases.

Resistant varieties are the only economical control practice.