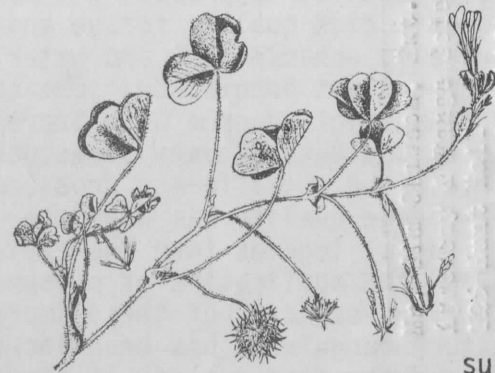


USE OF ANNUAL LEGUMES  
IN BUTTE COUNTY  
FOR  
RANGE IMPROVEMENT  
September 1978



subterranean clover

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TEN YEARS EXPERIENCE USING SUB AND ROSE CLOVERS  
FOR RANGE IMPROVEMENT IN BUTTE COUNTY

There are approximately 330,000 acres of privately owned rangeland in Butte County. The nonirrigated forage produced on this rangeland provides 70% of the total AUM's (animal unit months) feed utilized annually by local beef cow/calf, stocker and sheep operations.

The objective of any planned system of range improvement and management is to produce the maximum yield of economic high quality forage and utilize this forage to enhance soil and water conservation and the plant population. One range-improvement and management program used increasingly since 1966 by the Butte County livestock industry to increase the total forage produced and also improve forage quality has been the establishment of annual legumes into the native grass rangeland and the application of phosphorus fertilizers. Carrying capacity of these improved grass/legume mixtures has been increased over four times, and the feed quality is above the minimum requirements for both cattle and sheep due to the nitrogen and protein produced by the annual legumes.

The economic advantages realized from establishing annual legumes and applying phosphorus fertilizers is a proven fact, but the initial cash costs of proper establishment and supplemental fertilizer costs require thorough evaluation and budgeting by any livestock operator considering this program. Initial establishment at current 1978 prices are estimated at \$40-\$65 per acre and \$12 per acre for biennial application of 200 pounds single super phosphate.

ACKNOWLEDGMENTS

Field Research Projects on Butte County Ranches:  
Ahart Ranch  
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Kister Ranch  
Available Publication: *Management of Clovers on California Annual Grasslands*, Leaflet 2661

- D. Heavy grazing during the summer or early fall prior to fall rains is essential so most vegetation is removed. This allows annual legume seedlings to be maintained and increase year after year.
- E. The need for supplemental fall application of phosphorus to established legume range can be determined from soil analysis and is essential for optimum legume growth.
- F. Additional fencing may be required for proper utilization and management of the improved range areas.
- G. If rodent populations increase and reach a level of economic importance, an effective control program should be initiated.
- H. A higher stocking rate will be required to properly utilize the increased forage production. Under-utilization will result in reduced clover plants since the grasses will be stimulated by the nitrogen produced by the clovers.
- I. Do not plant annual clovers unless more livestock is available to utilize the increased forage production.

When a range improvement program includes the establishment and fertilization of annual legumes, all steps are equally important:

- I. Site Selection
- II. Seedbed Preparation
- III. Variety Selection, Seeding Rate, Inoculation and Seeding on Time
- IV. Initial Fertilization and Supplemental Fertilizer Applications
- V. Grazing Management

## ESTIMATED ESTABLISHMENT COSTS

COSTS/ACRE	<u>Low</u>	<u>High</u>
Seed - 10 lbs. @\$1.25	\$12.50	
15 lbs. @\$1.25		18.75
Single Super Phosphate -		
300 lbs. @\$90/T	13.50	
500 lbs. @\$90/T		22.50
Apply fertilizer	4.25	7.00
Seedbed	5.00	10.00
Plant seed	2.25	4.00
Cover seed	<u>2.00</u>	<u>2.00</u>
	\$39.50	\$64.25

### SUGGESTED GUIDELINES FOR ESTABLISHMENT AND MANAGEMENT OF ANNUAL LEGUME/GRASS MIXTURE RANGELAND

- I. Select suitable site for nonirrigated range improvement
  - A. Native range on reasonably open and rolling foothills. Range sites with limited potential should be avoided: dense brush or trees, steep slopes, excessive exposed rock, and very shallow soils.
  - B. Cropland where returns are uneconomical but would be satisfactory for permanent vegetation or rotation from grazing to cropland to utilize the excessive nitrogen produced by the legumes.
- II. Seedbed preparation
  - A. Light discing on open rangeland in the spring or summer has proven the most successful. The seedbed should provide sufficient loose material to allow the seed contact with the soil and reduce competition.

- B. Shallow discing, once over and not more than 1½ inches deep, of grainland and stubble without excessive cloddiness is desirable.
- III. Selecting varieties, seeding rates, inoculation, and seeding on time

A. It is best to plant a mixture of Rose and Subterranean clovers. These annual plants need to reseed themselves, and there is an advantage in having a mixture of legume plants with a wide growth and maturity range. This compensates for variable soil and rainfall conditions and can provide earlier and later utilization. Include varieties that have proven production and reseeding ability for Butte County.

B. A standard seeding rate of 10 to 15 pounds of raw seed per acre should include approximately 7 to 10 pounds of three or four Subterranean clover varieties and approximately 3 to 5 pounds of one or two Rose clover varieties. The clover stand should produce 50-100 pounds of seed per acre the first year and more in subsequent years. Varieties with good production and reseeding ability in Butte County are Wilton or California Common and Hykon rose clover; Sub clover varieties: Geraldton, Daliak, Seaton Park, Howard and Woogenellup or Mt. Barker if planted at higher elevations or on soil types where extra moisture is available to insure reseeding. Sub clover does not do well on high pH adobe clay soils. But clover or other medics can be included on some clay soil sites but can be damaged by the alfalfa weevil.

C. Inoculation of the legume seed is essential. This procedure provides an adequate supply of the appropriate nitrogen-fixing bacteria to legume seeds. The inoculation procedure can be done by the rancher or provided by the seed dealer. Inadequate inoculation will result in poor stand seeding establishment or failure. Poorly-inoculated clovers are worthless.

D. Broadcast inoculated seed just prior to the first good fall rains. Some effort should be made to cover the seed to prevent seed and seedling loss to birds or moisture stress after germination. Planting after the 15th of November is questionable.

IV. Fertilization

A. If soils planted to legumes do not contain adequate available phosphorus and sulfur, these nutrients must be supplied to insure optimum productivity. Initial applications of 300 to 500 pounds of single super phosphate when the seedbed is being prepared should correct most situations where phosphorus or sulfur is inadequate for legumes.

B. A soil analysis can provide valuable information for developing a long-term range fertilizer program. A good phosphorus level for legume-grass rangeland is 10 ppm phosphorus. Supplemental applications of 200 pounds of single super phosphate every other fall should keep grass/legume rangeland producing at an optimum level.

C. Do not use nitrogen fertilizer where annual legumes have been planted.

V. Management

A. Good, healthy, properly-inoculated legumes produce nitrogen that will stimulate the growth of grasses. This grass competition must be heavily grazed or the legume plant population will be reduced and can be eliminated.

B. Graze to utilize early fall legume and grass growth but keep soil-punching by livestock to a minimum.

C. The first year when annual legumes are blooming and setting seed (April 15 to June 1) do not graze. Graze later when the seed is hard.