Rangeland Forage
almost trebled by seeding rose clover and use of sulfur-bearing fertilizers

R. J. Arkley, W. N. Helphinstine, and W. A. Williams

Rose clover seeded on ranges in Stanislaus County during the past two years increased forage production 82% and crude protein production 234% on an acre basis.

When sulfur-bearing fertilizers were also used, a marked improvement in the growth of rose clover was achieved, which resulted in an increase of 285% in total forage and 662% of crude protein over the unfertilized and unseeded range.

Rose clover—an annual legume—has proven valuable in other areas because of its ability to produce nutritious feed under conditions of limited rainfall and infertile soil. It provides late green feed since it matures from two to five weeks later than most of the plants present on this type of range. It also helps build up the nitrogen level in the soil, which in turn stimulates the growth of the more desirable grasses.

Because large areas of land—formerly growing barley and wheat—have been returned to range pasture, the resultant plant cover, in many cases, has provided a rather short grazing season with limited production, field trials—for the introduction of rose clover—were established on experimental plots on a ranch near La Grange. The soil—classified as Snelling sandy loam—is fairly representative of large areas of dry farmed grain land extending along the eastern side of the Great Valley from Placer County to Tulare County. Alfilaria, soft chess, wild oats, foxtail, and ripgut are the dominant species, with—a common association of plants in range pastures converted from grain farming—a few native clovers, lupine, and widely scattered patches of bur clover present.

The test field—formerly cropped intermittently to grain since 1900—was planted in part to rose clover in October 1952. Eight pounds of inoculated seed were broadcast on oat stubble from which a volunteer hay crop had been cut. Fertilizer plots were established across the border of the seeding during the fall of 1953. Four fertilizer treatments—including gypsum, single superphosphate, treble superphosphate, and 16-20-0—were applied. There were five replications of each. Plots were harvested April 28 when the rose clover was in bloom and the alfilaria had set seed and was almost mature.

Fertilization of the unseeded range with phosphate and sulfur-bearing materials showed little effect upon either total forage or protein produced. A small increase in total forage was observed where nitrogen—16-20-0—was included, but there was no increase in the total protein produced.

The presence of rose clover without fertilization nearly doubled the total forage production and tripled the protein production at the time of harvest, April 28. The addition of relatively small amounts of sulfur-bearing fertilizers—largely because they had a favorable effect on the legume content of the nearly doubled forage—gave a further increase of 50% over the unfertilized rose clover planting. Thus the total forage obtained was almost three times more than that of the unfertilized and unseeded range. The effect of reseeding plus fertilization was even more marked on the crude protein produced—381 to 388 pounds per acre as compared to 50 to 67 pounds for the resident range. While such large increases may not be realized over wide areas, responses even half as great would still make this kind of range improvement profitable.

Although 100 pounds per acre of treble superphosphate—containing only two pounds of sulfur—increased both

Concluded on next page
NEW PUBLICATIONS
—now ready for distribution—

WEED CONTROL BY SOIL STERILIZATION, by Alden S. Crafts and William A. Harvey, Cir. 446.

FORAGE
Continued from preceding page

total forage and crude protein, there was no appreciable change in the per cent of phosphorus in the feed; so it is possible that the increased growth was due mainly to the sulfur.

The effects of sulfur and phosphate were not completely isolated by the experiments, but the close relationship between the sulfur content of the feed and the amount of sulfur applied in the fertilizer clearly indicates the importance of sulfur nutrition on this soil. A marked stimulation of native clovers through application of sulfur on an experimental range in Madera County has been reported.

The value of phosphate fertilizer—while remaining in doubt on this point—is important elsewhere, particularly on hardpan soils. Further work will determine more precisely the relative importance of sulfur and phosphate fertilizers and the most economical levels of application.

The accepted practice in this area is to leave a portion of the vegetation to be used for fall grazing and to afford protection for the new growth of plants in the fall. Prior to the fall storms, this residual feed is still high in total food value but deficient in protein.

The resident range—sampled April 28—contained no more than 4.6% to 6% protein, whereas the protein content of feed containing rose clover remained at 7.4% to 7.8% throughout the summer.

The results of the field trials have encouraged range improvement through reseeding and fertilization among Stanislaus County ranchers. As the trials are continued and the benefits more definitely established, these practices—although they should be limited to soils formed from granitic parent material which have been shown to respond to the addition of sulfur-bearing fertilizers to legumes—are expected to become more widespread.

Additional studies will show the duration of the beneficial effects of seeding and fertilization and the most economical rates and methods of application.

R. J. Arkley is Associate Specialist in Soils, University of California, Berkeley.
W. N. Helichasie is Farm Advisor, Stanislaus County, University of California.
W. A. Williams is Assistant Professor of Agronomy, University of California, Davis.

The above progress report is based on State Extension Project No. 4144.

DONATIONS FOR AGRICULTURAL RESEARCH
Gifts to the University of California for research by the Division of Agricultural Sciences accepted in June 1955

BERKELEY

New York Zoological Society.............................$1,000.00
For support of study of primates in relation to grassland
and human economy

DAVIS

Chas. Bach Company......................................$200.00
For study on physiology of blood spots
Breun Manufacturing Company..........................$400.00
For study on physiology of blood spots
Butler Metal Magic.........................................$1,000.00
For protecting and insulating surfaces of structures in the animal
environmental program in Imperial Valley
California Pioneering Cotton Seed Distributors........$6,700.00
For cotton irrigation studies
Cirrus Industry Research Assoc..........................$665.59
For bulk handling studies in citrus
Germania's ..................................................22,300 Twist-ems
For breeding investigations in vegetable crops
Grower-Shippers Vegetable Assn........................$4,400.00
For breeding program for development of lettuce varieties
with resistance for the Salinas Valley
Salinas-Pajaro area..........................................$4,592.00
For vegetable disease investigations, particularly in the
Salinas-Pajaro area
Walter M. Mulholland.................................$1,000.00
For testing gum to prevent rats from climbing hawsers between
dock and ship
Pittman-Moore Company.................................$3,500.00
For research on propagation of viruses in tissue other than
of chicken origin
Sugar Research Foundation, Inc.........................$2,500.00
For research on effect of various types of sugar on canned cling peaches

LOS ANGELES

American Cyanamid Co ..................................50% high test cyanamide
For studies on irrigation and soils
Blue Diamond Corporation................................Fine sand
California Planting Cotton Seed Distributors........$10,000.00
For defoliation research in cotton

Colorado Fuel & Iron Corporation.................75% diammonium phosphate
For greenhouse use
Los Pueblos Orchard Co.................................100 orchard plans
For research
Montecito Chemical Co.................................200# Kasil
For research
Stauffer Chemical Co...............................300# ferric sulfate
For fertilizer studies
Swift & Company, Plant Food Division................150# Golden Vigor
For studies on irrigation and soils
Vita-Pest, Inc...........................................30 cu. yds., Vita-Pest
For studies on irrigation and soils

RIVERSIDE

Braun Corporation........................................700# Orana A
For studies on value of Orana A applications in combating boron
sclerosis in citrus
Chemagro Corporation..............................$6,000.00
For study of effectiveness of diphenyl and chloroform as insecticides
and miticides, including evaluation and determination of residues in
fruit, vegetable and field crops, and insecticidal effectiveness and mode
of action of two derivatives of the P-0 isomer of Meta-Srioxo
E. I. du Pont Co..........................................1 ton NuGreen
For experiments on virus sprays for citrus
Heyden Chemical Corporation........................HC 1281-1/2
For growth regulator trials on citrus
Shell Chemical Corporation...........................2 drums liquid insecticide NOIBN-D-D (AC-4000) 1,159 lbs.
For studies in plant pathology

STATEWIDE

California Avocado Society..........................$500.00
For construction of an avocado propagating house and/or
canopy research
Jack P. Corkins..........................................20% Phygon XL
For tests for control of scales on citrus
C. M. Volkman & Co..................................50% hybrid seed corn
For variety test trials