Rose Clover as Forage

legume new to state responds to good grazing practices on annual type range, brush burns, and grain land

R. Merton Love and Dorman C. Sumner

Rose clover—*Trifolium hirtum* All.—a forage legume recently imported to California responds favorably to the grazing treatment recommended for established perennial and desirable annual forage plants.

Grazing may be delayed until late March, but if this is done, rose clover should be grazed heavily for about a month. Recent experience in Placer County showed that 150 Hereford cows and their calves were required to graze satisfactorily a new 50-acre planting in 30 days. That is three animals to the acre for a month.

Whether the field is grazed throughout the winter, or heavily for a shorter period in the spring, the first objective should be to graze the weeds, both grasses and nongrasses, as closely as possible. Stock should be removed from the field before the last spring rains to allow the clover plants to recover and set a good seed crop. The more moisture used by the rose clover plants as they mature, the less there will be available for the undesirable summer annuals, such as star thistle and tarweed.

A field of rose clover may look weedy the first year as a result of the initial cultivation, which encourages weed seed germination, but the field will take on a cleaner appearance each succeeding year if livestock use is handled properly.

Rose clover will grow in soils where practically no other plants survive, and will even provide some forage under unfavorable conditions. It grows in the shade of tall grasses and no other range legume has proved to be so well adapted to such a great variety of soil types and climatic conditions. The first year tried, it was successful in 25 range plot trials in 15 counties. This success has since extended to many more trials and to acreage seedings made in almost every rainfall zone of the state.

Areas planted to rose clover may be grazed as soon as the weeds and annual grasses are of pasturable height. By that time the cotyledons—seedling leaves—of the rose clover will have dropped off, and the true leaflets will have formed. The plants will be two to five inches high. Care should be taken to prevent trampling damage if the soil is too wet.

Rose clover is a many-branched, winter annual legume that grows from three to 18 inches high. As with most true clovers, each leaf has three leaflets at equal distances from the end of the leaf stalk, the center one somewhat larger than the other two. The leaf stalks are from one half to two inches long, and the flower heads are rose-colored, spherical and about three-fourths inch across.

Rose clover seed became commercially available in California in 1949, five years after range plot trials were initiated. By 1951 about 33 tons of certified seed were available to ranchers. A 1950 seeding of 4,400 acres of a controlled burn in Shasta County and another seeding of 1,000 acres of controlled burn in Butte County included rose clover seed in the mixture. Both seedings were successful.

The first packet of rose clover seed came to California as an introduction from Turkey and was planted in the fall of 1944. Rose clover thrives in Central Europe and the Mediterranean Basin.

No palatability studies have been conducted, but observations throughout the state show that sheep and cattle graze rose clover as readily as they do other annual clovers even when it is completely dried up. It is also well liked by dove and quail.

In Santa Clara County two series of plots were seeded side by side—one series with subclover and the other series with rose clover. After three years, rose clover had invaded the subclover plots. The rose clover-subclover area was grazed much more closely by cattle than was the subclover area.

Little is known about the nutritive value of rose clover, but it appears to be comparable with that of other legumes. Protein content of rose clover is slightly less than that of bur clover at similar stages. Rose clover samples had a protein content of 24.9% when lush and green, compared with 27.0% for bur clover. At the flowering stage, 12.6% protein in rose clover may be compared with 15.0% for bur clover. Dead, dry rose clover plants have 8.0% protein, and those for bur clover, 13.9%.

Samples cut in May, from a mixed planting in a phosphated field in Sacramento County, showed the following protein contents: rose clover, 12.6%; crimson clover, 16.7%; and subclover, 17.3%.

Rose clover seed should be dusted with a general *Trifolium*—true clover—inoculant just before planting. The seed may be drilled or broadcast.

A minimum of seedbed preparation is required for rose clover. From 100 to 300 pounds of single superphosphate per acre should be applied and the field disked before the fall rains. After seeding, the area should be rolled with a ringroller or cultipacker. This procedure should re-

Continued on page 12

Left: **Very poor first-year growth of rose clover and other legumes seeded November 1, 1949, and photographed March 27, 1950.** ***Right:*** **Same field photographed May 21, 1951. Of the mixture seeded, rose clover was the only one showing a marked improvement in stand and growth the second year as a result of volunteering.**

Lemon tree in the Escondido area defoliated by California red scale. The injury occurred when natural enemies were virtually eliminated for an eleven-month period by light monthly sprays of DDT, designed to be ineffective against scale.

SCALE

Continued from page 8

The orange grower in the Escondido area probably can quit treating and expect to achieve good biological control without suffering from severe pest damage if certain qualifications are understood.

Foremost, the grower should have constant advice from a field entomologist well versed in biological as well as chemical control. Since this entomologist would undoubtedly occasionally recommend colonization of natural enemies, the need for an insectary is indicated. A single grower or a few growers can not afford an insectary so some sort of group cooperation would be desirable. A similar program of supervised control is being successfully used by the University in co-operation with alfalfa and cotton growers who have organized into districts in northern California. If parasites or predators are doing a good job no treatment is made, otherwise insecticides are recommended.

Many factors would have to be considered and appropriate action taken to permit a citrus grower safely to quit and stay out of treatment.

Existing ants should be controlled. Pests should not be abundant initially, or damage might occur before natural enemies become numerous. The effect of past treatments in reducing natural enemy populations should be evaluated so that initial colonizations of insectary-reared parasites or predators can be made if necessary. The microclimate of the grove should be considered for it will favor or inhibit parasites and predators. The necessity for future deficiency or fungicidal sprays must be evaluated because these materials, too, may inhibit natural enemies. The degree of contamination with field or road dust to which the trees are subjected must be considered. Finally, the emergency use of any insecticide to control a pest which may do damage if left untreated must be considered from the standpoint of its over-all effect against the pest and all natural enemies, not the pest alone.

Even after the grower has quit treatment and developed a satisfactory degree of natural control in his grove his problems are not solved for good. Unusually extreme climatic conditions may kill off natural enemy populations with the result that serious pest increases follow. This happened throughout southern California in the case of the black scale following the winters of 1948–49 and 1949–50. An insectary maintaining stocks of the more important natural enemies would be very valuable under those circumstances.

The lemon grower may reduce treatment under similar conditions but he will probably have to treat for citrus bud mite, perhaps for rust mite. If bud mite control can be obtained by the judicious use of a material which has relatively little adverse effect on natural enemies of other pests, no other treatments may be required. Colonization of insectary-reared red scale parasites may be more necessary on lemons than on oranges because the lemon is more preferred by the red scale. The lemon tree also may furnish a poorer microenvironment for red scale parasites.

Individual growers without help from entomologists and insectaries, may leave untreated some acreage—at least one acre—which would not seriously hurt them economically if pest damage should occur. The block chosen to go untreated should be kept free of ants at all times and it should be relatively dust free. If after two or three years the untreated trees are satisfactorily controlled biologically, more acreage can be added to the program.

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CLOVER

Continued from page 3

sult in: *1*, a firm seedbed; *2*, a light mulch of soil and organic matter to cover the seed; *3*, a ready source of phosphate for the young plants which is necessary for maximum growth of clover; and *4*, nitrogen-fixing bacteria will be present for nodulation of the roots.

From one to 10 pounds of seed per acre should be sufficient. An original seeding of one pound per acre will generally develop into a solid stand in four or five years. The higher rate should provide a solid stand the second year.

If the soil is extremely infertile and supporting practically no growth of native plants, rose clover may be used alone. If there is a fairly good cover of native weedy annual grasses and other types, a mixture of 50% rose clover, 25% subclover, and 25% crimson clover is recommended. Bur clover is not recommended in this original mixture because if it is not already present on a range, it is probably not adapted to that particular soil under existing conditions.

A mixture of winter annual legumes is desirable for two reasons: *1*. Seasons vary tremendously in California, and rose clover may do better one year, and subclover another, on the same site. *2*. Any field has some soil variation, and rose clover will occupy the poorer soil or better drained areas, subclover will do well on the better soil or moister sections.

Rose clover may be included in the seeding mixture for use after controlled brush burns. For seeding burns one half to one pound of seed per acre is usually adequate when included in a general seed mix, such as harding, smilo, burnet, and alfalfa. The seed should be inoculated with a Nitragin-type preparation just before mixing it with the other seeds.

The only evidence on the use of rose clover on grain land is a 50-acre planting near Farmington, San Joaquin County. It was seeded by plane December 1, 1950, in red oat stubble. No seedbed preparation was made because of wet weather. Single superphosphate was applied at the rate of 500 pounds per acre. Inoculated seed was used at the rate of eight pounds per acre.

The advantages of growing rose clover on grain land are: *1*. It will do well on soil types that do not support a good growth of bur clover. *2*. It will provide a good aftermath feed to supplement the cereal stubble. *3*. It will volunteer in succeeding years and add nitrogen to the soil, thus aiding the grain crop.

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More detailed information on the subject of range improvement is presented in Circular 371, Improving California Brush Ranges, *by R. Merton Love and Burle J. Jones, and Circular 407* Rose Clover, *by R. Merton Love and Dorman C. Sumner. These circulars are available without charge at the local office of the Farm Advisor or by addressing a request to Agricultural Publications, 22 Giannini Hall, University of California, Berkeley 4, California.*