

California Range Plants

key to improvement is knowledge and proper use of three easily distinguishable types of range plants

R. Merton Love and Dorman C. Sumner

Range improvement means replacing undesirable plants with a more desirable type of forage.

To achieve improvement it is necessary to be familiar with the types of range plants—to recognize them, to know something about their growth, characteristics, and feed value. It is difficult to gain this knowledge because there are many hundreds of species of range plants. However, from the standpoint of growth rhythm and season to use, it is only necessary to distinguish between three types of plants:

1. Weedy aggressive winter and summer annuals.
2. Desirable annuals and short-lived perennials.
3. Long-lived perennials.

Weedy winter annuals are undesirable because of low production and harmful or unpalatable seed parts. They germinate after the fall rains, develop rapidly and mature early. They are a good winter feed when green, but often have obnoxious barbed seed that remain on the seed heads long after maturity. Among the weedy winter annuals are ripgut, red brome, downy chess, common and Mediterranean foxtail, introduced and native annual fescue, little quakinggrass, crested dogtail, medusa head, goatgrass, annual hairgrass and nitgrass.

Weedy aggressive summer annuals also are low producers and often have harmful or unpalatable seed parts. The maximum growth begins in late spring and summer. They may be of some feed value

after fall rains. Among the summer annuals are prairie three-awn, yellow star thistle, napa thistle, spikeweeds, gum plants, tarweeds, turkey mullein, and vinegar weed.

Desirable Annuals

The second group of plant types—the desirable annuals and short-lived perennials—germinate after the fall rains. Their seedling development is fairly rapid and they mature later than the weedy annuals. They will recover following spring grazing if given a chance. They offer a good late feed—later than the weedy annuals.

Seeds are available for annual and perennial ryegrass, wild oat, and the bromegrasses. Soft chess is the principal annual bromegrass throughout the Sierra foothills, Great Valley, and the Coast range. If seed were available, soft chess would replace ryegrass as the desirable annual in mixtures on chamise burns.

Among the annual legumes, bur clover is common to most areas except the granitic soils in the Sierra foothills on the eastside of the San Joaquin Valley and the reddish soils in the Sierra foothills of the Sacramento Valley. Subclover does well in acid soils if other conditions are favorable. Roseclover thrives on soils that do not support good growth of bur clover or subclover. Crimson clover has done well in the intermediate elevations of the Sierra. Spanish clover is widely distributed in the state, and the sweet clovers will grow at elevations up to 5,000 feet.



The most important single factor in range improvement is the management of grazing practices to discourage weedy species and encourage desirable annuals and perennials.

Three common species of filaree—cut-leaf, whitestem, and broadleaf—are also desirable annuals found on most California ranges, although the broadleaf type is the poorest of the three.

Long-lived Perennials

The third type of range plants, the long-lived perennials, develop slowly as seedlings, and are poor competitors when young. Older plants, however, green up even before the fall rains, and remain green long after the last spring rains. They provide good feed for a longer season than annuals. They must be allowed to store reserves for ample root development to withstand dry periods.

Among the long-lived perennials hardinggrass is one of the best and most

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Summer appearance following mowing and stocking of second year stand of rose, crimson, and subclovers. Note clean appearance of field and absence of summer-growing tarweeds.



CAPACITY

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larger inshipments of feed grains would be necessary to attain the projected levels of livestock production. Grain used for food and industrial purposes plus that exported from California seaports is roughly equivalent to half of the state's total production.

California's hay production is within 3% or 4% of being in balance with requirements. The alfalfa hay shipped into the state just about equals the 150,000 tons of hay dehydrated or otherwise used in commercial mixed feeds. The projected 1955 production of hay is about 9% above 1950, and will be adequate for California's livestock needs.

California's livestock industry has a relatively strong competitive position because the state is a deficit producing area—but production must be efficient because costs of feed and labor are high. The projected 1955 level of production—compared to 1950—represents increases of 10% in cattle and calves, 18% in sheep, lambs, and wool, 9% in hogs, 9% in milk, 31% in chickens raised, 60% in commercial broilers, 11% in eggs, and 22% in turkeys. Most of the additional

production is expected to come from an expansion in number of producing animals rather than any marked increase in efficiency per unit. Some further efficiency can be expected from gradual improvement in breeding, disease and parasite control, and better balanced rations.

The projected high levels of California's agricultural production are depend-

Projected Adjustments in Major Uses of Cropland*

	Million acres		
	1950	1951	1955
Intertilled crops	1.9	2.5	2.4
Close growing crops	3.9	3.6	3.8
Hay and (crop) pasture	2.0	1.9	2.2
Fruit and nuts	1.5	1.5	1.5
Total land cropped	9.3	9.5	9.9
Summer fallow	1.2	1.1	1.0
Total cropland	10.5	10.6	10.9

* Estimated crop acreages, revised in line with 1950 census results, were not available at the time this study was made.

ent upon ample supplies of machines, irrigation equipment, feeds, fertilizers, pesticides, and related materials. Adequate labor is of prime importance, although mechanization is reducing the

labor requirement for some crops, notably cotton and sugar beets.

Additional numbers of specialized farm machines needed—above 1950 levels—include 5,000 more cotton pickers, 2,300 nut harvesters, 2,000 pruning rigs, and 500 agricultural airplanes. Additional pickup balers, bale loaders, field forage harvesters also will be required. Large numbers of replacement machines covering the whole range of farming will be required annually to maintain farm production. Adequate supplies of repair parts are of signal importance.

The projected production will require more fertilizer than was used in 1950. The 1955 requirements will be 37%—56,000 tons—more nitrogen, 70%—42,000 tons—more phosphate, and 10%—1,000 tons—more potash. Cotton and barley probably will account for most of the additional nitrogen, and general field crops would account for most of the phosphate. Vegetables and fruits already are fertilized at near optimum levels.

To be continued

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RANGE

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durable dry-land grasses. Grown in combination with dry-land alfalfa, it does well in the coastal areas from Monterey to Del Norte County, and in the Sierra foothill ranges above the 15" rainfall belt.

Smilo has about the same climatic tolerance as hardinggrass but should be

used on lighter soils. It grows well from San Diego County to Humboldt County on the coast ranges, and from Kern to Shasta at intermediate elevations.

Chewing fescue and highland bentgrass are good competitors for Klamath weed. Crested wheatgrass does well above 3,000 feet, and timothy is used in high areas of cold winter and moderate summers. Redtop also is adapted to mountain

areas. Sherman big bluegrass can be used on adverse soil and climatic sites.

Tall fescue is more drought tolerant, thriftier, and taller than its parent, meadow fescue. It is useful in areas of 20" rainfall or more. The three principal strains—alta fescue, Kentucky 31, and Goar—are late winter, spring, and summer growers. Orchardgrass is not quite so drought tolerant as tall fescue, but can stand more shade.

Rhodesgrass is suited for use on sandy sites south of the Tehachapi, smooth brome for northeastern California, and tall oatgrass for the dry lands of the coastal areas and intermediate elevations in the Sierra.

Nodding and purple stipa are among the hardiest of the native California bunchgrasses. They range from south to north on the coast and in the foothill regions.

Veldtgrass looks especially promising in coastal areas of southern California.

Perennial Legumes

Among the perennial legumes, alfalfa is used on the better dry-range sites. Narrowleaf birdsfoot trefoil is useful under very alkaline conditions, at higher elevations the broadleaf type may be used. Under all other situations a mixture of both types may be advisable, but neither type is as drought tolerant as alfalfa.

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Third-year stand of rose clover on infertile land in eastern Glenn County. Photo taken in May, 1952, by M. D. Miller, University of California Farm Advisor.



RANGE

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Burnet is a perennial herb, as palatable and nutritious as filaree. It can withstand heavy grazing and is a strong competitor against weedy annuals.

Certain perennials are less desirable because of low production or unpalatability. Among those are saltgrass, beardless wild-rye, squirreltail, velvetgrass, foptail barley, spreading three-awn, and sweet vernalgrass.

Steps to Improve Range

Annuals and perennials have their advantages and disadvantages, and a good range will have a mixture of both.

The chief advantage of the annuals is the flush of feed they supply in the rainy season. The chief advantage of the perennials is the stability they give to the forage supply. Under proper seasonal use they will last longer than many of the annuals, including ryegrass.

Improvement of the range should be based on the types present. Winter annual legumes should be encouraged by proper season of use, by fertilizers or soil amendments, and by seeding. If desirable grasses are present, they will gradually increase in density. After the population of weedy annuals is decreased and soil fertility is improved, the better type grasses may be seeded.

The control of the grazing season or management is the most important single factor in range improvement.

Time of use has a large influence upon the composition of a range in relation to weedy annuals, desirable annuals, and perennials. Early heavy grazing while the weedy species are palatable, reduces their capacity to produce seed. If the animals are removed from the area early and before the soil moisture is depleted, the desirable annuals, short-lived perennials, and perennials will recover and produce a considerable amount of seed. After the seed has shattered the animals can be brought back to the area to utilize

this feed and trample the seed into the ground. This type of management results in suppressing the weedy types and encourages the better forage species on the range.

This type of management can also be used in seasonal rotation. The land is divided into three fields, and livestock is allowed to graze heavily in the spring in field one. If removed before all soil moisture is exhausted the undesirable annuals will not recover as well as the desirable annuals and perennials, and their seed supplies are reduced. Field two is treated in this manner the second, field three the third year.

This rotation of seasonal use will gradually increase the desirable annuals and perennials—if present—and decrease the undesirable annuals.

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WALNUTS

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A 100% mortality was obtained in all instances, regardless of the location of the larvae in the chamber during the fumigation.

Natural mortality in the three controls ranged 12.5% to 32%, and averaged 21.8%.

Bromine Residue

Walnut meats contain considerable amounts of oil, and methyl bromide is readily absorbed by fats and oils. Analyses were run to determine the amount of bromine absorbed by the nuts.

Whole walnuts in sealed double-walled cellophane bags were vacuum-fumigated with two pounds methyl bromide per 1,000 cubic feet. They were exposed to fumigation for 30 minutes.

One hour after fumigation the nut meats had taken up an average of 0.41 milligram—mg—of bromine per 100 grams fresh weight. After 21 days in the cellophane bag the nuts had taken up, on the average, as much as 4.84 mg of bromine per 100 grams fresh weight. This indicates that walnuts sealed in cellophane bags and subjected to fumigation with methyl bromide continue to absorb bromine for at least three weeks after fumigation.

Shelled walnuts of different sizes were packed in five-pound cardboard cartons sealed only by staples. They were subjected to vacuum fumigation with 2.86 pounds of methyl bromide per 1,000 cubic feet.

Residue was high at first but became almost constant after the first 24 hours of fumigation. This was true regardless of the size of the shelled walnut meat, for halves as well as for pieces—quarters and broken halves—and pills—eighths or smaller.

Analyses carried out as much as nine weeks after fumigation found the bromine residue at about the same level.

The residue experiments showed that whole or shelled walnuts which are subjected to vacuum fumigation with methyl

bromide may be expected to show bromine residues.

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The above progress report is based on Research Project No. 1228.

Navel orangeworm larvae, showing webbing and frass caused by larvae feeding. Photo greatly enlarged.

