Forage Composition and Yield

studies of forage regrowth and grazing capacity on controlled burned areas in northern California

Arthur W. Sampson and L. T. Burcham

Forage production studies following controlled burns on chaparral areas indicated that forage is usually most abundant in the first two years after burning.

The majority of the studies were conducted in Mendocino County to represent coastal conditions, and in Shasta County to typify the interior brush associations. The areas were not reseeded or otherwise improved after burning. The vegetation was permitted to invade unmolested—except for livestock grazing—as is still a common practice.

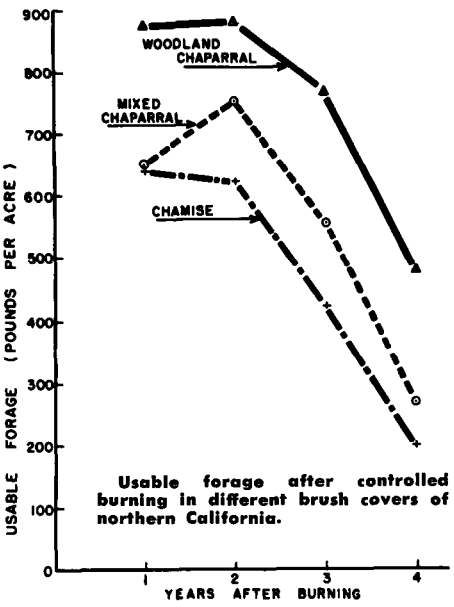
The studied areas included practically pure stands of chaparral; mixed chaparral, ceanothus, and both sprouting and nonsprouting manzanita; California scrub oak and interior live oak; patches of yerba santa, and a scattering of other shrubs. The topography varied from fairly steep to nearly level, and the soil from shallow and inferior—especially where chamise predominated—to fairly deep and productive on the scrub and live oak areas.

The first year after a burn, foxtail fescue, mouse barley, wild oat—offering fair-to-good forage or browse—and little quakinggrass, nitgrass, Pacific fescue, and red brome—poor forage—were the most abundant grasses.

There were many species of forbs—broad-leaved herbs—but common soapplant, fineleaf lotus, Spanish clover—fair-to-good as forage—and whispering bells, blue gilia, rattlesnake weed, longleaf filago, and Fremont death camas—poor forage—were especially common. The most abundant brush seedlings and sprouts that are fair-to-good as forage were California live oak, ceanothus, chamise, and dwarf interior live oak. Other species present were chaparral coffeeberry, greenleaf and some other manzanitas, and toyon.

Most of the grasses and forbs were present for three years after burning, though in different amounts from year to year. In all cases, forbs accounted for a much greater volume of growth than the grasses.

From the first year after burning and in subsequent seasons, great numbers of brush sprouts and seedlings occurred on the different burned sites, especially on areas of chamise, oaks, manzanitas, and yerba santa. Even so, much of the soil surface was exposed to the elements, and active erosion occurred, notably on the steeper slopes.



Usable forage after controlled burning in different brush covers of northern California.

Grazing capacity was relatively low on most areas, but sheep utilized the feed better than cattle. Although the average total growth per acre for all the sites studied—both herbaceous and woody growth—averaged 695 pounds the first year after burning and 5,214 pounds the fourth year thereafter, the amount of palatable forage was low. Sprouts accounted for a large part of the total growth and produced much greater volume in the second, third, and fourth years.

The greatest forage poundage was on the woodland chaparral areas and the least was on the chamise lands. In the third year after burning, there was a consistent and rather sharp decline in forage yield on all the areas. Although the acreage requirement per month—acres per animal unit month—was high in all the brush types, it was much the highest on the chamise areas, which occupied the most inferior sites. Because of this, it is strongly indicated that most extensive chamise areas in northern California should be set aside for watershed protection and managed as breeding and hunting grounds for game—notably deer—for which they are eminently suited. These considerations particularly pertain to areas where the chamise occurs in primary ecological succession.

The combined usefulness of chamise lands for watershed protection and as game range appears to far exceed their value for grazing of domestic livestock. On the other hand, the mixed chaparral areas of the region studied showed a consistently higher grazing capacity than that of the chamise lands. Even so, only the better-quality sites—indicated by fairly deep soil and luxuriant, dense brush—justify the cost of controlled burning or of other means of opening up the brush. The more restricted woodland cover occupied the highest quality sites, and the grazing capacity was the best of the types studied. The forage yields and quality were the best and the least fluctuating during the four years of measurement.

The comparative grazing capacity for sheep and for cattle on the three most

Mixed chaparral area showing regrowth of brush sprouts and herbs two years after burning.

Off-flavor in Canned Olives

tests show application of certain insecticides to olive trees will produce musty flavor in the fruit

Reese H. Vaughn and Hudson T. Hartmann

Benzene hexachloride—lindane and B.H.C.—applied to olive trees before harvest will result in a moldy, musty off-flavor in the canned olives, according to the results of tests initiated in July 1953.

Investigation of the first of three outbreaks of off-flavor in canned ripe olives—which have occurred during the past 10 years in olives grown in widely separated areas in California—revealed nothing which might explain the off-flavor. However, during the investigation of the second outbreak, circumstantial evidence was found which indicated that the undesirable flavor detected in the olives could have resulted from drift of benzene hexachloride—an insecticide applied by airplane dusting to a cotton field adjacent to an olive grove. In the meantime, experience with benzene hexachloride as an insecticide for protection of other crops, such as carrots, tomatoes, potatoes, peaches, walnuts, and so forth, had shown that the application of this compound resulted in the appearance of a moldy, musty taste in the crops so treated.

Early in 1953, the third of the outbreaks of the same moldy, musty off-flavor occurred. It was suspected that insecticide residues of the benzene hexachloride type were involved. This time more concrete evidence of the presence of an insecticide was obtained by biological assay.

To verify or refute this suspicion, a test was established—at the University's Wolfskill Experimental Orchard at Winters—to determine if applications of benzene hexachloride to trees would result in off-flavors in the processed fruits.

Effect of Type of Application of Lindane and B.H.C to Trees on Presence of Off-flavor in Canned Green-ripe olives.

Sample	Application	Off-flavor*
	Treated with Lindane	
1	Pruning cuts	Slight moldy off-flavor
2	Foliage spray	Definite moldy off-flavor objectionable
3	Soil under tree	Pronounced moldy off-flavor very objectionable
	Treated with B.H.C	
4	Pruning cuts	Definite moldy off-flavor objectionable
5	Foliage spray	Pronounced moldy off-flavor very objectionable
6	Soil under tree	Strongest moldy off-flavor most objectionable
7	None (control)	No off-flavor

* Based on results of tasting panel composed of individuals known to be sensitive to this off-flavor.

Four-year-old trees of the Manzanillo variety were used. The following treatments were given to separate trees on July 14, 1953, using wettable powders of commercially available preparations:

Lindane

25% gamma isomer of benzene hexachloride

Treatment *1*—Applied to soil under trees at the rate of one pound per acre, followed by irrigation.

Treatment *2*—Foliage spray—applied at a concentration of one pound per 100 gallons.

Treatment *3*—Painted on fresh pruning cuts, using a solution containing one-eighth pound per gallon.

B.H.C

10% gamma isomer of benzene hexachloride—40% other isomers of benzene hexachloride

Treatment *1*—Applied to soil under trees at the rate of two pounds per acre, followed by irrigation.

Treatment *2*—Foliage spray—applied

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extensive brush associations showed much contrast.

Allowing the customary five sheep as the equivalent of one cow in forage requirements, the percentage difference in grazing capacity was in favor of sheep. This ratio holds up rather well for each of the four seasons after burning. A better ratio would be six or seven sheep to an animal unit month for ranges of this kind.

The incoming vegetation in the areas studied after burning consisted largely of annual grasses and forbs and of numerous sprouts of chamise, oaks, and ceanothi. Usually, the forage was most abundant the first two years after burning. By the end of the fourth year, brush had reoccupied most of the area.

The best grazing season proved to be about March 15 to June 1. After early summer the animals were inclined to travel extensively and consequently lost in condition.

Pure chamise lands are generally so low in forage production after burning that they are unprofitable for livestock grazing. Their usefulness is mainly that of watershed protection and as game range. Mixed chaparral lands also are low grade for grazing, and only the more productive areas — economically considered—are worthy of burning. The much more restricted woodland-chaparral areas produced the most and the best forage. Much of the sprout growth was palatable until fairly late in the summer.

The study demonstrated the importance of developing and carrying out a post-burn plan of range improvement, such as fencing, water development, reseeding where needed, and sometimes of reburning to destroy incoming brush.

Comparison of Grazing Capacity for Sheep and for Cattle on Three of the Most Common Types of Brushlands in Northern California After Controlled Burning.

Dominant cover	Yrs. after burning	Grazing capacity (acres per AUM)		Difference	
		Sheep	Cattle	Actual	%
Chamise	1	2.4	3.1	0.7	22.6
	2	2.5	3.4	0.9	26.5
	3	4.5	5.5	1.0	18.2
	4	7.0	8.3	1.3	15.7
Mixed chaparral	1	2.15	3.0	0.85	28.3
	2	1.8	2.3	0.50	21.7
	3	2.4	3.0	0.60	20.0
	4	4.55	5.9	1.35	23.7
Woodland chaparral	1	1.55	2.2	0.65	29.5
	2	1.50	2.0	0.50	25.0
	3	1.65	2.2	0.55	25.0
	4	2.40	3.0	0.60	20.0

Arthur W. Sampson is Professor of Forestry, Emeritus, University of California, Berkeley.

L. T. Burcham is Senior Range Technician, Range Improvement, California Division of Forestry, Sacramento.

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