Range Brush Problems

twelve recommendations for the study of range land utilization

The following article is condensed from a manuscript on an analytical study of the range brush problem in California by Robert F. Griggs, Professor of Biology, University of Pittsburgh, Pennsylvania, on assignment by the University of California, College of Agriculture, Committee on Range Land Utilization. The recommendations are now in the hands of the committee for consideration.

Complete conversion of chamise to grass. Chamise at right appears to form a good watershed cover but close inspection indicates erosion. Under the grass cover on the right, the soil is well stabilized and appears to be building up.

Nearly seventeen thousand square miles of California—one acre out of every 10—are covered with brush for which no important use has been discovered.

The country covered with woodland and woodland-grass is as extensive as the area of original chaparral, each covering 10% of the state. In many places these types of range and large areas of cut-over timberland are being invaded rapidly by brush.

Although the brush covers a large area, one of California's problems springs not from shortage of land but from shortage of water.

Brush, like other vegetation, takes water out of the soil, but it is not certain how much total removal of brush would increase irrigation waters.

Coupled with the effect of brush on the depletion of the water supply is the possibility that its removal may increase erosion hazard.

Complexity of Problem

California is more varied in climate and in biology than any other state. The brush growth, reflecting these and other factors, is very diversified over the state.

1. In southern California there is a menace of uncontrollable fires and the country south of Tehachapi is frequently visited by torrential storms.

Many of the soils in southern California seem to have a high erodibility and the slopes of the Coast Range in that section attain an exceptional steepness.

2. The fog-bound Redwood Region of the north coast presents entirely different problems.

3. The summer-dry woodland-grass ranges of the Sierra Nevada foothills have little resemblance to either the southern or the Redwood sections.

Much of this country is hilly with fairly gentle slopes. Erosion is less of a hazard than in the south partly because rainfall is scanty. But the soil is often comparatively good and retentive of moisture so that it is relatively easy to get a stand of other forage where the brush has been eliminated. It is here that the invasion of good range by brush usually is the most marked.

4. The chamise covered lands present somewhat different problems because chamise usually occupy the poorer soils.

5. The brush of the Coast Range lying southwest of the San Joaquin Valley differs from each of the above. partaking somewhat of the character of southern California and somewhat of the more northerly chamise region.

6. At the northern end of the Sacramento Valley, much of the Shasta Region is covered by a growth of manzanita different from any of the preceding.

A number of detailed investigations are needed, each confined to a single district. These studies should be designed to work out the interrelationship between the plants, the climate and the various brush lands. Such studies have been begun.

One way to utilize the state's vast area of brush—if anyone knew how to do so economically—would be to use it directly through managing it rather than by replacing it with some other type of vegetation.

The most obvious use for the wood fiber produced by 10,000,000 acres of brush would be as raw material in wood-using or chemical industries.

A major factor in range difficulties is the long summer dry season when the green forage of springtime dries up.

There has been a great increase in the

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Coyote brush invading range under light utilization of forage. Most of the shrubs on the right are in their third or fifth year of growth.

RANGELAND

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employment of irrigated pastures in recent years and in some cases, at least, such use of land has proven highly profitable.

The evergreen brush species, if kept down to a point where they do not use up the stored water of the soil, maintain succulence and continue growth through the long summer.

Browsing Qualities

Some of the species are reported to have rather remarkable value as feed.

If any highly nutritious and palatable species could be grown without irrigation on a considerable fraction of the brush-covered country, it would add enormously to the carrying power of the ranges.

Management

Management is fully as important as is fundamental knowledge of the range plants and their growth habits, on which management must rest.

Correlations of range burning with good management means usually that the brush must be controlled in rather small units. There is considerable advantage in rotating burning over a range so that the rancher shall have different pastures in different stages and so can move his stock around as conditions demand.

Promising attempts to obtain a cover of perennial and annual forage plants on brush burns have been carried out recently.

The plants used were rye grass—annual and perennial—harding grass, tall oat grass, tall fescue, smilo, stipa spp., orchard grass, burr clover, rose clover, yellow sweet clover, alfalfa burnet and others.

The plants seeded in—by offering competition—decidedly retard reinvasion by the brush.

It is not established which perennials do best in different conditions and more investigation is required.

Returning Brush

Many annuals start from seed more quickly than perennials do and may therefore offer more effective competition to the returning brush than perennials.

Harding grass and other perennials have proven valuable for reseeding. They provide exceptionally good forage, stay green late into the summer and hold their ground, increasing year by year. But the seed is expensive and its use is uneconomical on some ranges.

Success in getting a stand in a reseeding program depends on seeding promptly after a burn.

Returning brush either through seedlings or sprouts remains an obstacle to success in establishing perennial pastures.

The simplest way of preventing the return of brush would be to chop it, but hand work and other mechanical means are much too costly on most ranges.

Herbicides

A good prospect seems to be in the use of selective herbicides.

In places where burning in dry times may be too hazardous, brush first killed with herbicides could be burned clean in periods too humid for the fire to spread beyond the area of dead brush.

Herbicides may be of extraordinary value in removing sprouts and seedlings from previously burned areas.

Although many problems require further study for the best utilization of brush lands, there is an especial need for an over-all coördinating agency to expedite these studies.

A brushland utilization board should be established with full power to set up committees on special aspects of brush management or control. The board could study directly or through committees the needs of brush management and/or control and recomend measures to be taken.

Recommendations

The recommendations made may be summarized:

1. That comprehensive experiments designed to determine the effect of vegetation on water supply be set up in areas representative of the chief types of brush and woodland grass—and perhaps of forests—over the state.
2. That research into the ecology of the brush species and their interrelations be expanded.
3. That studies be made of the beneficial and harmful wild mammals and birds on brush lands.
4. That the ablest and most experienced wood technologists and cellulose chemists be obtained and put to work on the separate brush species with a view of ascertaining the properties of their wood and fiber—mechanical and chemical.
5. That a comprehensive study be made of the forage value of the brush forming species. This should be widely comparative and include both nutritive value and palatability to animals.
6. Thorough investigation of means of increasing promising native range plants and of improving the quality thereof.
7. Long and careful study of the management of selected brush ranges similar to that which has been given to the San Joaquin Range.
8. That research in reseeding cleared brush ranges be continued and broadened including both annuals and perennials.
9. That additional steps be taken to make available seed needed by ranchers and to improve the quality of the seed.
10. That an investigation of the relation of burning to seed germination be undertaken.
11. That experiments with herbicides be continued and expanded with a view of finding their proper place in the range improvement program.
12. That a Brushland Utilization Board be set up.

NUCELLAR

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mits an easily recognized character to its hybrid progeny.

The nucellar seedling itself is seldom satisfactory as an orchard tree. In most varieties it will produce a rank, upright and thorny growth, and will be very slow to come into fruiting. It may in many instances take 10 years or more to get a good crop.

Budwood

Desirable nucellar seedlings may be used as sources of budwood but because of the uncertainty as to performance from a commercial standpoint, it is advisable to obtain buds from a nucellar line which has been established long enough to come into fruit and demonstrate its value.

It should be emphasized that any nucellar seedling line must be subjected to extensive trial before it can be recommended for propagation.

Still Experimental

Although some lines show distinct promise, the fact alone that they are of nucellar origin is not a guarantee of superiority. The comparisons reported here have been only with the parent old lines; the performance of the young lines relative to other vigorous strains of the same variety is not established, although one of the lines—the Frost Eureka—is under study.

One of the important uncertainties in the whole problem is how long the vigor of nucellar lines may persist. The possibility of reinfection with virus must be considered as well as the chance that new virus diseases transmittable through the seed may appear in citrus.

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The above progress report is based upon Research Project No. 261. The experiments reported were initiated by H. B. Frost, of the Division of Plant Breeding, about 1918, and were carried on by him until recently. The studies with the Frost Eureka lemon are being made by Professor L. D. Batchelor, Director of the Citrus Experiment Station, Riverside.