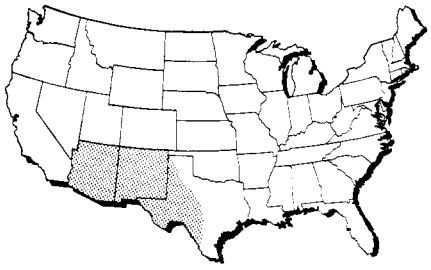
GRASSLANDS IMPROVEMENT

A Vast Profit Potential—II

Agriculture west of the Rockies is traditionally heavily dependent on livestock grazing. In less intensively farmed areas improvement problems may be tough, but the opportunity is there. Pest control, fertilizer, and other management techniques offer potential profit here, just as in the other areas described in Ag and Food's January feature



SOUTHWEST

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Shrub control is among the most pressing of the problems that include reseeding practices, range fertilization, and management

THE SOUTHWEST, like many geographic areas, has rather vague boundaries, but it can be roughly defined as southwestern Texas and approximately the southern half of New Mexico and Arizona.

Throughout the area the year has two dry seasons separating two rainy periods. Summer rains are restricted largely to July, August, and the first half of September. Winter rains commonly fall during the period from late November to early March. These wet seasons are separated by dry periods that become increasingly distinct and more droughty with a decrease in altitude. Snow falls only occasionally and usually remains only a few hours before melting.

Major Problems and Remedies

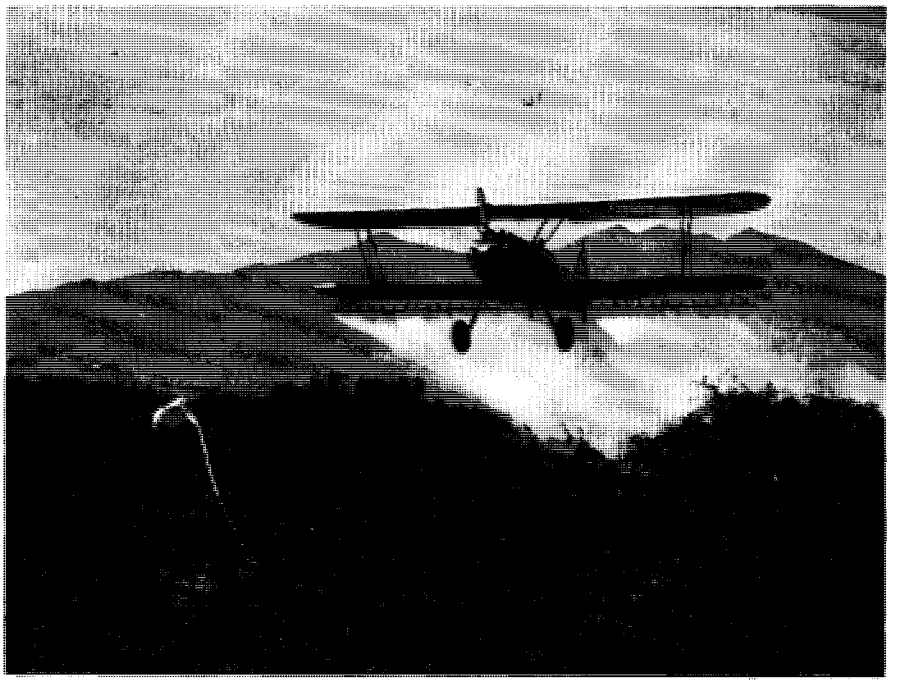
The Southwest probably has no greater variety of range problems than most of the West. It does, however, have some that are more acute than those encountered in other regions. Problems that currently seem to be most pressing relate to: shrub control, management practices, reseeding practices, and range fertilization. Number one on this list in its effect on range carrying capacities and livestock production is shrub control.

Shrub Problem

Although there are some nonwoody shrub species classed as undesirable by range managers, these are primarily those that are listed as poisonous rather than competitive. The woody species, on the other hand, constitute the bulk of undesirables on southwestern ranges. Their chief claim to undesirability lies in their ability to compete successfully with the better forage plants and to utilize moisture that otherwise would produce feed. Recent studies indicate that these shrubs, rather than the grasses that were once dominant, are the true climax dominants of the Southwest. Because of their natural adaptability to the area they can rarely be kept in check by the commonly used range management practices but must be controlled by techniques that literally destroy the plants.

Throughout the Southwest's lower elevations, mesquite is the principal invader and one of the most difficult to destroy. Recent estimates place its acreage in Arizona, New Mexico, and Texas at more than 70 million, the greater part on land that was grassland less than 100 years ago. This spread is still going on, though serious efforts are now being made to keep the plants in check. Burroweed and snakeweed, low-growing shrubs whose ranges extend from southwestern Texas across New Mexico, Arizona, and into northern Mexico, also have invaded former grassland areas. Although figures on the total acreage occupied by these species are not available, it is known that as long ago as 1937 there were at least 5.5 million acres of burroweed and 4.5 million of snakeweed in Arizona alone. In the past 18 years, these plants have continued to spread.

Another undesirable in much of the Southwest is cactus. Two forms, prickly pear and the arborescent or "cholla" type are most abundant. A Texas study made in 1939 indicated 60 million acres of range land in that state alone infested



In southern Arizona an airplane applies 2,4,5-T to kill mesquite as one step in improving range

with cacti of this one genus. As with burroweed and snakeweed, this spread has continued in spite of increasing efforts at control.

Two major control techniques—physical and chemical—have been used with varying degrees of success. The cabling method, by which mesquite trees are uprooted with a loosely looped cable stretched between two large tractors traveling at a high rate of speed, has been somewhat effective. It is most satisfactory on open, level range populated with an even-aged stand of fairly mature trees. Younger trees on the other hand, usually bend over and are little harmed.

Within recent years, extensive acreages, particularly in Texas, have been sprayed with herbicides, primarily 2,4-D and 2,4,5-T. Although some extravagant claims appear in the press, most tests run to date indicate that an approximately 40 to 50% kill can be expected with the ester of 2,4,5-T. Results with the amine form of 2,4,5-T or with 2,4-D have generally been less satisfactory. Obviously, there is still much to be desired in developing a truly effective herbicide for use on mesquite.

Other control methods that have proved practical are hand grubbing, burning, and hand application of diesel oil. Young stands can be economically removed by use of a grub hoe. Unless plants are killed by this method while still very young, however, the labor involved is excessive and the method becomes impractical. Burning is effective but there is usually too little forage on most mesquite-infested ranges to carry a fire hot enough to kill large trees. Then too, mesquite is an aggressive sprouter and usually only about 5 to 10% of the trees are completely killed. As with the herbicides, however, killing back to the ground is a long step in the right direction.

Although expensive on heavily infested ranges, the most effective and one of the most practical methods of mesquite control is by application of a low-grade diesel oil at the base of the tree. No more than 0.5 to 1 pint is required for most single-stemmed trees. If carefully applied, 100% kills may be expected. Fortifying the oil with 2,4,5-T ester and applying it as a basal spray reduces the amount of oil required and increases its effectiveness.

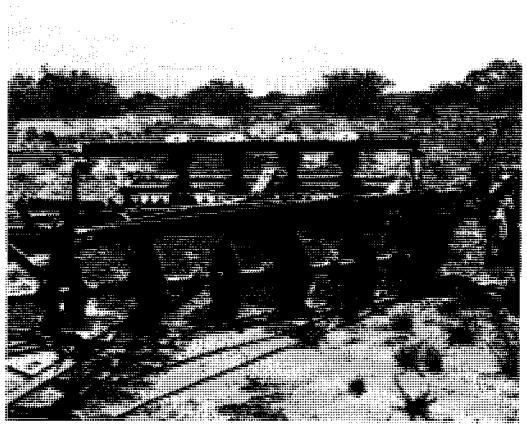
Burroweed and snakeweed may perhaps be killed more completely by burning than by any other method. Mowing during the dry period preceding summer rains has also proved to give a high degree of kill although not as high as fire. No results are currently available on the effect of spraying snakeweed with herbicides. Some data are available on burroweed, however, which indicate that under certain conditions this shrub may be controlled satisfactorily by spraying with 2,4-D. More research is needed to determine just what the conditions are that render a plant susceptible.

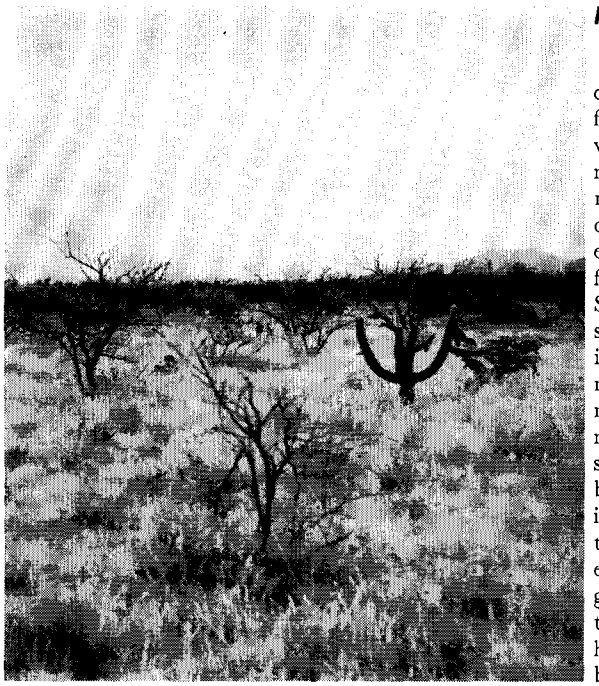
Cacti have proved to be more difficult to control than any of the other principal noxious plants in the Southwest. Most members of the genus *Opuntia* tend to propagate vegetatively when the stems come in contact with the ground. This largely rules out control by mowing, cabling, or other physical means unless the plants are later removed from the area. But, because control by means other than physical have not proved effective, chopping or grubbing followed by removal have been employed more commonly than other means.

Management Practices

Little research has been done in the Southwest on the best methods of handling ranges. The common practice since the first cattle were introduced about 1500 has been year-long grazing. General feeling has been that, since the forage was available throughout the year, ranges were adapted to this kind of use. There have been indications for many years, on the other hand, that southwestern grasses are no better able to withstand this continuous pressure than are grasses of other regions. Conservative stocking has long been recognized as of extreme importance. In spite of this long-time emphasis, however, there has been a general tendency down through the years to carry more livestock than the ranges would support. This has been largely because of a failure to realize that ranges cannot be stocked permanently with the number that can be carried in the best or even average years. In periods of drought, therefore, when forage production might drop to as low as 10% of the production of the better years, ranges are overstocked. Research has shown that in order for an operation to be on a sound economic basis: "(a) average rate of stocking should set 20 to 40% below average forage production; (b) the grazing herd should be handled so as to facilitate adjusting stocking in accordance with annual forage supply; (c) animal numbers should be increased slowly after a drought period to give range vegetation a chance to recover its former vigor and density." An earlier study [U. S. Forest Service, Annual report of the Southwestern Forest and Range Experiment Station. 62 pp. mimeo, (1950)] indicated that black grama, one of the dominant and most desirable desert grassland species, deteriorated under continued heavy use. As a corrective measure the ranges were

Eccentric disk is used in pitting rangeland before seeding





Velvet mesquite after spraying with 2,4,5-T in southern Arizona. A 40% kill was achieved in this case

grazed under a "semi-deferred" plan of use, which involves removal of a portion of the herd during the summer growing season to pastures where tobosa grass (which is not palatable during the winter) predominates. This gives the black grama a rest during the critical growing period and makes use of the tobosa during its season of maximum palatability. Because the season of tobosa use is short and because even at its best, tobosa grass is considerably less palatable than black grama, this system of grazing harmed neither species and definitely benefited the grama.

Complete ranch-management plans should be based on an inventory of available forage resources. For many years this inventory was obtained by a standarized range survey. Within recent years, however, this type of survey has been replaced by an inventory that emphasizes the condition of the range and the direction or trend of this condition. On a map of the ranch each of the principal forage types is delineated; each of these is then classified on a basis of condition.

Four condition classes, each based on percentage of potential production, are used. These, and the forage production represented by each, are: (a) excellent, 75 to 100% of potential; (b) good, 50 to 75%; (c) fair, 25 to 50%; (d) poor, 25% or less. The chief advantage of this type of survey over the old is that it places emphasis on the degree of improvement possible and indicates whether current management practices are improving or deteriorating the range.

Reseeding Practices

When, as a result of drought, misuse, or other factors, grasses have been virtually eradicated from a range, artificial reseeding must be resorted to. Because of the difficulty of establishing grasses or other forage plants in the arid Southwest, however, reseeding is not advised unless it is certain that management methods alone will not restore the cover. Most run-down ranges will respond to management or to brush control. In many instances, in fact, competition between brush and grass effectively prevents grass growth, and ranges thought to be in need of reseeding have been restored merely by brush control.

Although most of the grasses native to the Southwest have been seeded with some degree of success, the best results have consistently been obtained with exotics. Under Arizona's extremely arid conditions the love grasses (*Eragrostis*) have proved to be best adapted. Lehmann love grass (*E. lehmanniana*) has been outstanding though both Boer love grass (*E. chloromelas*) and weeping love grass (*E. curvuld*) have given good results in many locations. On areas subject to occasional flooding or on soil abnormally damp much of the time, Johnson grass (*Sorghun halepense*) and blue panicum (*Panicum antidotale*) thrive and produce an abundance of forage. At moderate elevations in Arizona and New Mexico where precipitation is higher than average Turkestan bluestem (*Andropogon ischaemum*), cane beard grass (*A. barbinodis*), and Wilman love grass (*E. suberba*) are well adapted and may produce an abundance of palatable forage.

Seedings of any sort, either native or exotic species, are never advisable unless the seeded area fits in with a practical plan of management. This means, essentially, that small seedings in large pastures are generally impractical because, if the seeded grasses are more relished than those in the balance of the pasture, they will soon be grazed into the ground and killed. Or, on the other hand, if the seeded species are less palatable they will be little used and the expense involved in their establishment may be largely wasted. Seedings, therefore, should be large enough to consitute the bulk of the forage in a pasture so that stocking rates and season of use can be based largely on the seeded grasses. A corollary to this is the recommendation to apply the same general rules of sound grazing practices to reseeded areas as to all other parts of the range. The same physiologic principles apply to reseeded grasses as to native species.

Range Fertilization

The value of range fertilization in the Southwest still has to be determined. Although the application of fertilizers on range lands has been conclusively proved to be economically feasible in other areas, there has been little research along this line in Arizona, New Mexico, or Texas. Some of the results obtained in northern California are thought provoking:

"Five years' results from repeated annual applications of 200 pounds per acre of ammonium phosphate-sulfate (16-20-0) show that this fertilizer: (a) increased forage production by an average of 2,882 pounds which is equivalent to 3.60 animal-unit-months per acre; (b) reduced fluctuation in forage from year to year; (c) advanced the date of grazing readiness by six weeks; (d) Doubled the length of the green feed period." [Hoglund, O. K., Miller, H. W., and Hafenrichter, A. L., *J. Range Management*, **5**, 55-61 (1952).]

Results obtained at Guthrie, Okla., were no less marked. Cleared, virgin brushland pasture at Guthrie, when fertilized with 300 pounds per acre of superphosphate drilled to a four-inch depth every three years increased beef production 58% or, from 84 to 133 pounds per acre. Seed production after grazing was increased 85% by the fertilization.

These two examples are cited as an indication of the results that may be obtained under a range-fertilization program. It is possible that portions of the Southwest, with its low rainfall, would not respond in their manner. Even if this should prove to be the case, however, much of the area has a mean-annual precipitation as high as or higher than the 16 inches recorded at the California location. Little is known of either climatic or edaphic limitations of range fertilization but the possible returns should be sufficiently tempting to stimulate much research on the subject.

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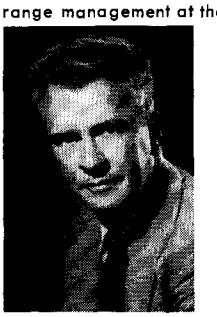

studied at the University of Minnesota, receiving his doctorate there in the early thirties. He has had experience in range ecology and conservation with the U. S. Forest Service and the Soil Conservation Service. With over 50 publications to his credit in range condition analysis, management, and ecology, Dr. Humphrey is a member of the American Society of Range Management, the Ecological Society of America, and AAAS.