The Growing Need for Integrated Brush Management

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Invasion of brush is often pointed to as one of the factors that has reduced the productivity of rangelands. Many people also include brush invasion as a part of the desertification process. It is common knowledge, among range managers, that a good brush control treatment can increase forage yield and may improve range condition. Forage responses, such as a doubling in yield and changes in the kinds of plants on the area to more preferred species are not uncommon. However, in the past, many range people were too short sighted in applying brush control. Treatments were often applied as quick fixes for the range ecosystem, with minimal consideration for the time needed for changes in plant composition (successional processes). Any gains realized were often lost in a short time (less than ten years) as brush either resprouted or reinfested the area, or livestock numbers were not adjusted to allow the preferred plants to fully colonize the area and so they were grazed out.

The realization that any one brush control technique rarely solved a brush problem led people to speak of a combination of treatments to give better brush management (Fisher et al. 1972 and Meadors et al. 1973). Planning a sequence of brush control treatments has evolved over the years and has become known as integrated brush management. Integrated brush management is the development and implementation of a sequence of control treatments designed to reduce the effect that brush has on preferred plant species over a number of years. The concept of integrated brush management was brought to full flower with the publication of *Brush Management* by Charles J. Scifres in 1980.

An integrated brush management plan will result in vegetation manipulations to maximize responses of desirable plant species, restore the characteristics of the range habitat, and in arid lands, reverse desertification. Integrated brush management operates in two major phases to produce the desired vegetative composition. The first is the careful selection of brush control techniques and/or their combination for satisfactory plant control with minimial disturbance to nontarget species and other range resources, all at an affordable cost. Secondly, the brush management system must be meshed into the existing management plan or with the co-development of an improved grazing plan.

The growing need for integrated brush management has been brought about because many ecologists wish to restore diversity to rangeland habitats. The systematic choice of techniques should result in lower economic inputs than those usually associated with brush control as a "one-time" need. Where desertification has been identified and there are signs of retrogression, integrated brush management hopefully can reverse that trend.

Brush increase, invasion, or "thicketization" of woodlands has been observed and noted for nearly a century. Some causes of this phenomena are:

- Wildfire suppression
- Heavy range use by livestock, wildlife, and feral animals (burros)
- Confining domestic animals by fencing
- Land cultivation and abandonment
- Introduction of exotic plants such as salt cedar or halogeton

No major range resource in the United States has escaped this intrusion and change in the range habitat. The result has been a decrease in herbaceous cover which also lowers infiltration rates of water into the soil, increases sediment in runoff waters, and has decreased habitat diversity for wildlife. Typical examples of regions in the United States with brush problems are the Great Basin with sagebrush, low plateaus and foothill areas with juniper stands, chaparral communities, desert grasslands, the southern mixed prairie with stands of mesquite, and the cross timbers of Oklahoma and Texas.

Integrated brush management is based on the commitment to develop a land management system that will produce a desired degree of change to restore the range's integrity. The rate and degree of change are tempered by the long-term objectives and overall goals of the ranch management plan. Vegetative succession on rangelands is slow, thus an extended planning horizon is needed. A planning horizon of 50 years is not unrealistic for this work. The economics of treatments are, as well, a major consideration. Spreading the costs over time is a desirable feature.

The concept of integrated brush management is presented graphically (Figure 1). Normal range productivity on brush infested land without brush management would follow the lower curve. The initial treatment would result in a rapid vegetative response but once the brush plants begin to regrow or reinvade, without a maintenance treatment, the production line would follow a depletion curve. Proper follow up treatments chosen for effectiveness and economy would keep the production increase realized from the initial treatment. This point is illustrated by the upper line. While response lines on Figure 1 are given in measures of acres/

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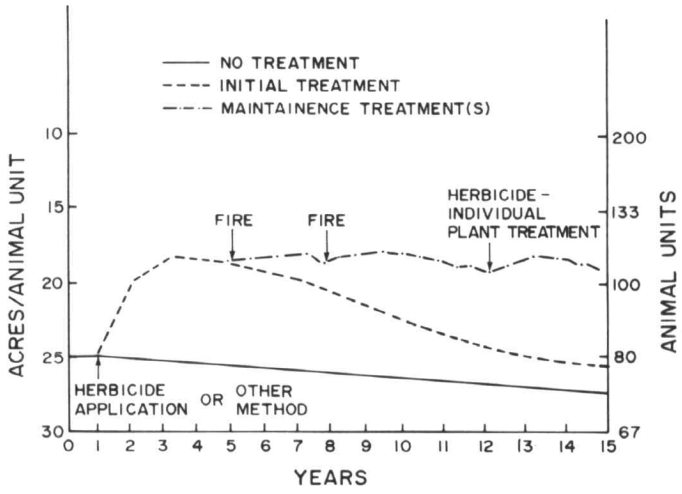

Fig. 1. *Graphical representation of the range resource's response to an integrated brush management system (adapted from Hamilton 1982).*

animal units or number of animals, the response could easily be considered as range condition, or some other measure of a range's health such as clean water flow in a stream.

The brush management scenario illustrated graphically is just one of many. Some common integrated brush management systems could include:

- Oak manipulation by chaining, goating for brush control, and a fire rotation for maintenance.
- Musk thistle control with a herbicide, maintenance with the thistle rosette weevil, and grazing management.
- Juniper control with a herbicide, a fire rotation for maintenance.
- Salt cedar treatment by root plowing, herbicide treatment for maintenance, fire for maintenance.
- Sagebrush control with fire, maintenance with fire and grazing management.
- Mesquite control with a herbicide, chaining to increase mortality, individual plant treatment (grubbing or herbicide) for maintenance (Figure 2).
- Juniper control by pushing, burning of debris piles and seeding, fire rotation for maintenance (Figure 3).

Potential combinations are nearly endless depending on brush species, range site potential, management objectives and economic inputs.

Implementing effective integrated brush management systems is not easy. It requires commitments from the ranch manager and the land owner. The process also needs a good technical base. People designing integrated brush management plans need to be specialists. They need to be able planners with technical backgrounds well rooted in ecology, range science, and weed science. Additional training in herbicide mode-of-action and knowledge of the herbicides' fate in the environment and the chemicals' intermediate compounds would be desirable. The person should possess a good working knowledge of integrated pest management as well as public relations techniques.

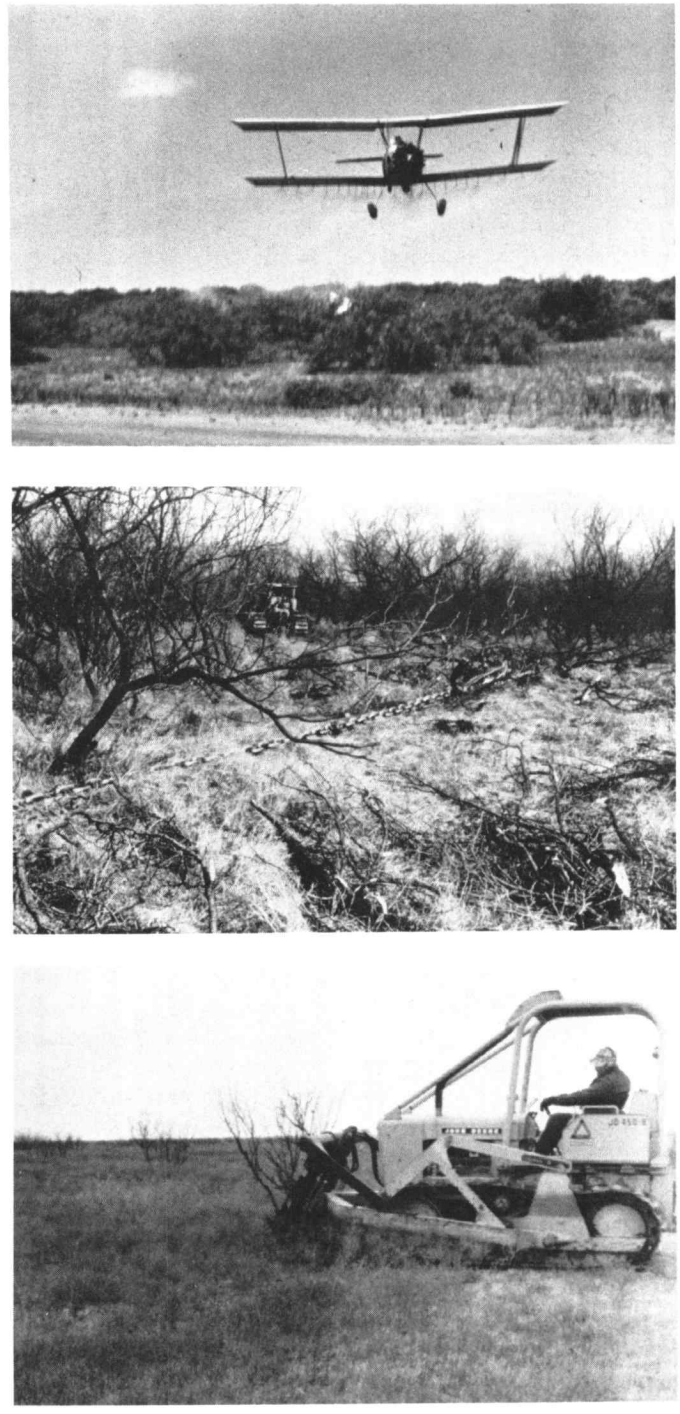

Fig. 2. *Brush management sequence that has proven effective for honey mesquite control. Photo A is an initial treatment with a herbicide, photo B depicts chaining to increase mortality and reduce the dead canopy, and photo C shows the use of low-energy grubbing to control reinvading mesquite.*

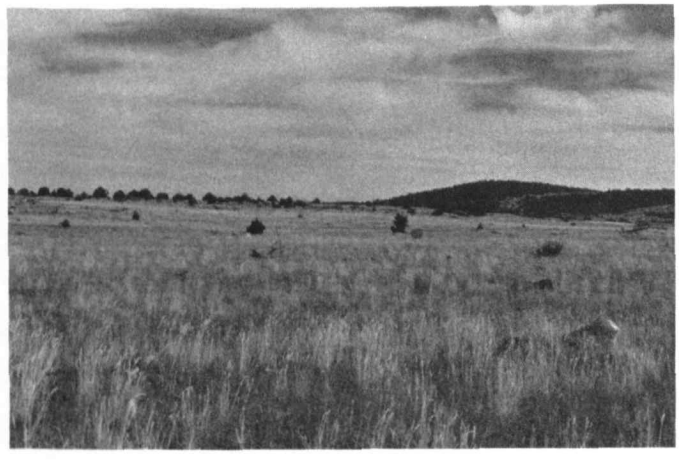

Fig. 3. *Successful juniper control has been accomplished using the following sequence. Photo A shows an initial treatment of grubbing or pushing. Photo B shows debris piles awaiting fire and seeding. Photo C is an area responding to the previous treatments.*

To realistically implement integrated brush management plans on a scale that would truly restore the diversity once enjoyed in the range habitats, a wide effort is needed. A network of range improvement specialists in federal agencies, state agencies (experiment station and extension), range agribusinesses, and consultant services would form a knowledge pool that could be drawn on to develop brush management/range improvement plans. The plans will help assure that the range resources would be restored at a rate that closely approximates succession and spread costs to a yearly level that would be economical.

Integrated brush management requires good range planning with realistic horizons. The goals are to manipulate range vegetation to maximize production of desirable plant species while restoring rangeland habitats. The plan would include treatments that are effective, as economical as possible, and those that would reverse the effects of degraded and desertified conditions. Implementation would be done utilizing the art and science of range management. Treatments would be applied, where possible, in a mosaic pattern that would rapidly create diversity on the site. The chosen treatments should also have minimal negative environmental impact. The integrated brush management system applied concurrently with proper grazing management will result in the long-term goal of a stable, productive range ecosystem.

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