ECONOMICS OF SPARYING SAGEBRUSH

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Various subspecies of big sagebrush have been successfully controlled throughout its range with different forms of 2,4-dichlorophenoxy acetic acid. Although response of vegetation after spraying is documented, evaluation of costs-benefits is scarce. Anticipated forage responses and the economics of spraying sagebrush on native and seeded high desert and foothill ranges of eastern Oregon are briefly reviewed here. In addition, some of the important factors affecting the economics of sagebrush spraying are identified and discussed. Forage responses were obtained from a survey of spray research applicable to eastern Oregon rangelands.

FACTORS INFLUENCING ECONOMICS OF SPRAYING

Although temperature and precipitation play a major role in influencing the forage response after sagebrush control, understory present before spraying, effectiveness of the spray treatment, and follow-up management strongly influence the economics of spraying. Each of these factors is discussed here.

Prior Understory

Increased production from sagebrush control comes, in part, from new plants, but the major increase in productivity generally is from an increase in vigor and size of existing vegetation. Thus, it is critical that an adequate population of desirable forage species be present on a site before treatment. Therefore, the forage species can reoccupy the area after the removal of undesirable species. If desirable forage species persist at a low level in the understory, these species will account for only a small amount of the increased production. Increases in understory productivity on sites in poor condition frequently are due to such species as cheatgrass. As a rule of thumb, 165 pounds of desirable forage per acre generally is believed necessary to attain a successful release of these species. Another rule of thumb is that there be at least one desirable bunchgrass to every 10 square feet for spraying of native range to be practical. This rule may not be valid, however, when competitive nondesirable species that are not affected by the herbicide such as Sandberg bluegrass are present.

Effectiveness of Spray Treatment

It is important to achieve a good sagebrush kill as forage response is clearly related to the effectiveness of the spray treatment. Research indicates that surviving sagebrush suppress grass production most proportionately. In one research trial, typical of most others, an average yield response of 135, 308, and 692 pounds per acre was associated with a 50, 75, and 100 percent sagebrush kill, respectively.

Effectiveness of the spray treatment also influences the effective life of the treatment as surviving sagebrush are a seed source of reinvading

sagebrush. On the Oregon high desert, sagebrush reestablishment after an initial kill of about 95 percent was held in check the first 10 years after treatment. Other spray research has shown a 15-year expected treatment life. On the other hand, sites with a 20 to 40 percent sagebrush survival required a second spraying seven to eight years later.

Follow-up Management

Some researchers have tried to evaluate the impact of grazing on the life of the treatment with variable results. As long as proper management is implemented to maintain a vigorous understory, grazing should have little effect on rates of sagebrush return. Deferment of grazing after spraying appears to have no clear-cut effect on sagebrush reestablishment. Overgrazing, however, promotes sagebrush reestablishment. Overgrazed range relinquishes both soil moisture and sunlight to sagebrush seeds. Greater sunlight intensity results in higher soil temperature and a more suitable microclimate for sagebrush establishment.

RESPONSES AND ECONOMICS

The primary objective of spraying sagebrush is increased forage production at competitive costs. Anticipated forage responses and the economics of spraying sagebrush on native and seeded high desert and foothill ranges are identified here.

High Desert Range

On native range of the Oregon high desert, annual increases in forage production have been reported to vary from about 60 to 700 pounds per acre. An average forage response, however, is about 282 pounds per acre per year during the first five post treatment years and 266 pounds thereafter until at least the 15th post treatment year. At this response level, with forage valued at $6.67 per AUM discounted at 15 percent interest, forage responses could justify a maximum spraying cost of about $16 per acre and still earn a 15 percent return on investment.

Yield responses on crested wheatgrass range have been reported to range up to 1,435 pounds per acre. An average forage response of about 321 pounds per acre through the 15th post treatment year generally is more typical. At this response level, responses could justify a maximum spraying cost of about $19.00 per acre.

Foothill Range

On native foothill range, forage responses have varied from 90 to 560 pounds per acre. An average response is typically about 275 pounds per acre. This response, with an effective spray treatment, could last through the 15th post-treatment year. At this response level, with forage valued at $6.67 per AUM discounted at 15 percent interest, increased production could justify a maximum spraying cost of about $16 per acre and still earn a 15 percent return on investment.

On crested wheatgrass foothill range, yield increases attributed to spraying averaged about 531 pounds per acre. This response should last through the 15th post-treatment year with an effective spray treatment. Given this response, a maximum spraying cost of about $31 per acre is justified.

SEASONAL FLAMMABILITY OF BIG SAGEBRUSH AND WESTERN JUNIPER FOLIAGE

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Fuel moisture changes and the resultant effect on relative flammability of sagebrush and western juniper foliage represent important parameters in predicting success of prescribed burns. Little is known about big sagebrush and juniper foliage moisture and their seasonal patterns. For most species, early spring represents a low foliage moisture content which increases as the growing season progresses. This is followed by decreasing foliage moisture during the dry period which persists until late summer or until fall precipitation.

This study was initiated to determine the seasonal change in foliage flammability indices. Associated foliage moisture and soil moisture contents also were studied to document seasonal patterns and their relation to flammability.

METHODS AND PROCEDURES

This study was initiated in the spring of 1978 and conducted at the Squaw Butte Range located 40 miles west of Burns, Oregon while the 1979 data were collected from plots five miles north of Hines, Oregon. Foliage samples, soil moisture samples, and ignition times were collected bimonthly from April 1 to October 1 of 1978 and 1979.

Ten individual plants of juniper and big sagebrush were marked and samples of the terminal four inches of branches were removed for evaluations. Subsamples were weighed, oven dried, and weighed to determine moisture content.

Flammability testing consisted of duplicate subsamples being burned in a propane burner at a given height above the flame. Subsamples were timed to determine the length of preheating required for ignition. At time of sample collection, soil samples were taken in the surface 10 inches for gravimetric determination of moisture content. All data were averaged over the two study years.