Effects of a Wildfire on Several Desert Grassland Shrub Species[1]

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Highlight

Sprouting ability and survival of six shrub species were observed following a June, 1963 wildfire. Sprout production and survival varied among species and initial class of damage. Larchleaf goldenweed was very sensitive to burning and should be easily controlled by fire. Mesquite, ocotillo, and Wheeler sotol were moderately sensitive to the fire. Control of these species would probably vary with the conditions and type of burn. The fire did not adversely affect false-mesquite or velvet-pod mimosa. Established stands of these two species may not be reduced by burning. However, increased density might be prevented if burning occurred before young plants were capable of sprouting.

Shrub invasion of highly productive desert grassland range has been widely recognized throughout much of the southwestern United States. Recent studies indicate that grazing and lack of range fires are both important causes of the invasion (Glendening and Paulsen, 1955; Humphrey, 1958; Parker and Martin, 1952).

In spite of a belief in fire as an agent preventing encroachment, a limited number of studies have been performed on today's ranges. The present study is an evaluation of shrub survival following a June, 1963 wildfire in an upper desert grassland type near Sasabe, Arizona.

The sprouting ability and survival of six shrub species were observed for three initial damage classes. The species selected were: 1) false-mesquite (*Calliandra eriophylla* Benth.) (Kearney and Peebles, 1960), 2) larchleaf goldenweed (*Aplopappus laricifolius* A. Gray), 3) mesquite (*Prosopis juliflora* var. *velutina* (Woot.) Sarg.), 4) ocotillo (*Fouquieria splendens* Engelm.), 5) velvet-pod mimosa (*Mimosa dysocarpa* Benth.), and 6) Wheeler sotol (*Dasylirion wheeleri* S. Wats.).

Methods and Materials

Shortly after the fire, 50 plants of each species were randomly selected and classified with respect to apparent fire damage. The three classes of damage were severe, moderate, or light. Plants with crowns charred or completely consumed were classed as severe damage. Moderate damage occurred only when portions of a plant were burned or charred. Plants which were only scorched without charring were classed as light damage. For each species of shrubs 30 individuals were observed in the severe damage class, 10 in the moderate damage class, and 10 in the light damage class. Data were collected on sprout numbers and location of sprout origin. The response of Wheeler sotol was classed by its apparent vigor since sprouts did not occur except in the form of regrowth from the terminal bud. Data were analyzed using a chi-square criterion test (Steel and Torrie, 1960).

Results and Discussion

Sprouting ability and survival of the individual shrubs varied among species and classes of initial fire damage (Fig. 1). False-mesquite plants, very desirable shrubs, classed as moderate and light damage showed significantly (.05) higher survival than the severely damaged plants both growing seasons after the fire. The second growing season, survival was 90% for severly damaged plants and 100% for moderately and lightly damaged plants. All sprout production occurred from the base of the stem or possibly some root sprouts. Reynolds and Bohning (1958) found that false-mesquite recovered quickly following burning and had a greater crown density than on unburned areas.

The reaction of larchleaf goldenweed was more severe than for the other species studied (Fig. 1). Survival between the three damage classes was significantly (.05) different. Severely damaged plants were completely killed and did not sprout by the end of the second growing season. Plants moderately damaged showed a 10% survival following the fire. The lightly damaged individuals had 90% survival the first growing season, but decreased to 80% the second growing season. The plants which survived the fire recovered through refoliation of the original crown.

Sprouting ability of mesquite was significantly (.05) different between light damage and moderate or severe damage classes (Fig. 1). No significant difference resulted between moderate and severe damage classes. All of the lightly damaged mesquite plants refoliated the crown and/or produced basal sprouts by the second growing season. Only basal sprouts were produced on severely damaged plants while 20% of the moderately and lightly damaged plants survived through refoliation and basal sprouts. These plants were classed for analysis according to the most numerous kind of sprouts.

Survival of ocotillo varied significantly (.05) among the three damage classes the first growing season (Fig. 1). By the second growing season only the severe damage class was significantly different from the other classes. The severe damage class had the least survival (33%), the moderate class the highest (60%), and the light class had 50% survival. Survival of ocotillo was confined to basal sprouts on moderately and severely damaged plants. Lightly damaged plants survived primarily through basal sprouts, but some plants also refoliated the original branches.

Survival of velvet-pod mimosa was high for all damage classes. The first growing season survival in the severe damage class was significantly (.05) less than the other two classes. No significant difference was detected in the survival rates among the three damage classes the second growing season. Survival was confined to basal sprouts produced from a "lignituber-like" structure. The second growing season prolific flowering was observed on burned and unburned plants. Seedpod produc-

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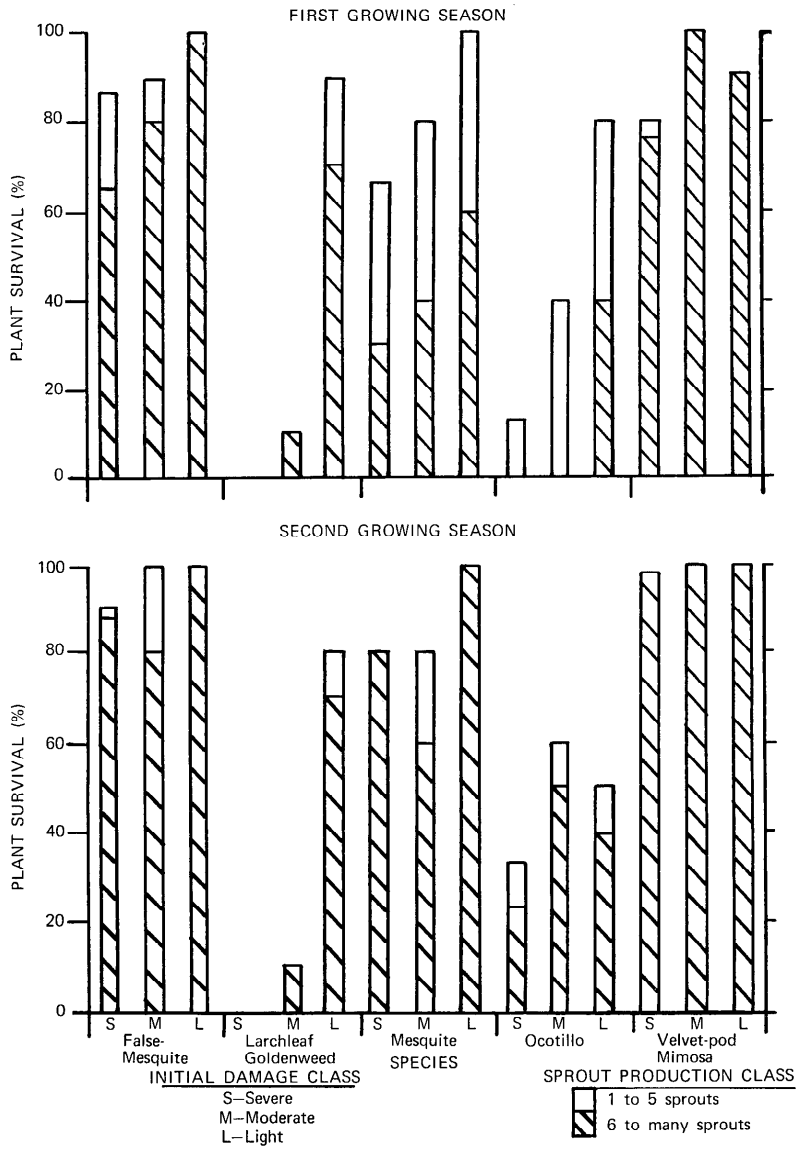

FIG. 1. Survival of five shrub species for two growing seasons following a wildfire.

tion was significantly (.05) greater on moderately damaged plants than on either severely or lightly damaged plants (Table 1).

The use of apparent vigor classes for Wheeler sotol was not consistent enough for evaluation; however, survival percentage was significantly (.05) different between the severely damaged plants and moderately or lightly damaged plants. All of the moderately and lightly damaged plants survived the fire. Only 3% of the severely damaged plants survived. Sprouting did not occur except as refoliation from the terminal bud.

Table 1. Seedpod production (percent of plants observed) on burned velvet-pod mimosa plants the second growing season after a wildfire.

Seedpod production class	Initial damage class		
	Severe	Moderate	Light
0	70	50	70
1 to 5	3	20	10
6 to many	27	30	20
Total	100	100	100

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