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Response of Round-headed Buckwheat to Summer Burning

Abstract

Wildfires are common in the shrubsteppe region of the western United States, but there is little information concerning the response of shrubs that grow on rock outcrops to burning. We thus examined the response of an isolated stand of round-headed buckwheat to two August wildfires. The pre-burn stand density of round-headed buckwheat plants averaged 133 plants per 100 m^2. In the first growing season following a wildfire in August 1984, density was reduced to 47 plants per 100 m^2. In the second growing season after the initial burning, almost all of the surviving burn-damaged plants produced flowers. Following a second wildfire in August 1987, density was reduced to 7 plants per 100 m^2. Despite the fact that the buckwheat plants were widely spaced and past the flowering stage, and that the shallow, stony soil supported only a sparse stand of herbaceous plants with low fuel potential, round-headed buckwheat plants were vulnerable to late summer burning.

Introduction

Wildfires are a common occurrence in the shrubsteppe region of the western United States (Wright *et al.* 1979), as they are on the Hanford Site in southcentral Washington. Ignition is caused by lightning strikes, usually in late July or August when shrub, grass, and forb tissues are at seasonal dryness and air temperatures are near maximal (Stone *et al.*1983). Most shrubsteppe shrubs are sensitive to summer wildfire. Sagebrush, *Artemisia tridentata,* bitterbrush, *Purshia tridentata,* and spiny hopsage, *Grayia spinosa,* are easily killed by summer burning (Uresk *et al.* 1976, Britton and Clark 1985, Rickard and McShane 1984). Rabbitbrush, *Chrysothamnus spp.,* has some capacity to sprout following summer burning (Daubenmire 1975, Bunting 1984); greasewood, *Sarcobatus vermiculatus,* unlike most other shrubs, sprouts readily after burning (Rickard and McShane 1984). As far as is known, there is no written documentation of the response of round-headed buckwheat, *Eriogonum sphaerocephalum,* to burning, but there is some information from Idaho that indicates that several species of *Eriogonum* other than *sphaerocephalum* are vulnerable to summer burning (Pechanec *et al.* 1954).

This paper documents the response of a single isolated stand of round-headed buckwheat to two August wildfires which burned in 1984 and again in 1987.

Location, Burn and Grazing History, and Methods

The buckwheat stand is located on the U.S. Department of Energy's Hanford Site in Benton County, Washington, Section 9, Range 27E, Township 10N and is representative of the *Eriogonum sphaerocephalum/Poa sandbergii* association as described by Daubenmire (1970). The elevation of the stand is 180 m above mean sea level and precipitation averages 19.7 cm annually (Stone *et al.* 1983). The stand is confined to a basalt rock outcrop surrounded by deeper soil that supports stands representative of the *Artemisia tridentata/Poa sandbergii* association (Daubenmire 1970). The herb understory is sparse and dominated by Sandberg's bluegrass, *Poa sandbergii,* with only small quantities of cheatgrass, *Bromus tectorum,* bottlebrush squirrel tail, *Sitanion hystrix,* and Thurber's needlegrass, *Stipa thurberiana.* Neither the stand nor the surrounding area has been grazed by livestock for at least 40 years, but fuel buildup was not evident.

The burn history of the stand in the years before 1960 is unknown, but, since then, it has burned twice; once in August of 1984 and again in August of 1987. Both fires burned entirely through the stand, as well as hundreds of hectares immediately surrounding the stand area, after originating at locations several kilometers from the stand. Both fires were moved fast enough by winds to thwart fire suppression efforts. Actual stand burning was not witnessed.

The information for this report was obtained from four permanent study plots, each 3 x 15 m (45 m^2), that had been established in the buckwheat stand in 1983, the year before the first wildfire, and all the living shrubs were counted. The living plants were again counted in May of 1985, 1986, and 1988. Characteristically, round-headed buckwheat plants flower in May. Some

leaves remain attached to twigs through the summer, but many have dropped by August and the plants are visibly moisture stressed.

Results and Discussion

The number of living round-headed buckwheat plants on the study plots before burning averaged 59.75 shrubs per plot (Table 1). In the first growing season following the first burning, counts averaged 21.25 plants per plot. Only one of the surviving shrubs had flowered and it was the only shrub on the study plots that had no visible burn damage. In the second growing season, six additional living shrubs were counted indicating that some of the burn damaged shrubs thought to be dead were eventual survivors. Of the 91 surviving plants, 89 were in flower in the second growing season indicating that burn damaged plants were able to restore reproductive vigor. Following the second burning, the number of living shrubs was reduced to an average of 3.25 plants per plot (Table 1).

A conclusion is that, although buckwheat shrubs are vulnerable to summer burning, they do have some capacity to recover from burning that damages more than one-half of the plant canopy. The only protection the shrubs have against wildfire is low stand density coupled with low fuel potential of the understory herbs.

Although the buckwheat stand has burned twice in a four year period, some shrubs on the outcrop have not been touched by fire. It was estimated that about 5 percent of the shrubs in the stand were not burned by either fire. These shrubs and those that recovered from burn damage are the seed sources for future buckwheat recolonization of the outcrop. It is important for at least a few shrubs to survive burning because rocky outcrops are isolated from one another, making natural seed transport from one outcrop to another difficult.

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TABLE 1. Counts of living round-headed buckwheat shrubs on four 3 x 15 m study plots in the year 1983 (pre-burn) and in the post-burn years 1985, 1986, and 1988.

Year	Plot 1	Plot 2	Plot 3	Plot 4	Mean	Density per 100 m^2
1983 (Pre-burn)	56	48	77	58	59.75	132.8
1985 (first season after burning)	15	12	37	21	21.25	47.2
1986 (second season after burning)	16	12	42	21	22.75	50.6
1988 (first season after second burning)	1	4	5	3	3.25	7.2

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