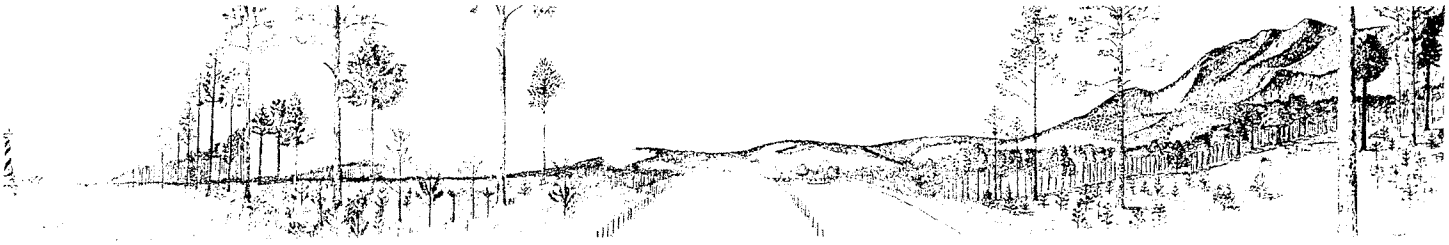

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PRESCRIBED BURNING FOR LAUREL AND RHODODENDRON CONTROL IN THE SOUTHERN APPALACHIANS

Abstract.–Prescribed fire shows promise as a tool for the control of laurel and rhododendron in the Southern Appalachian mountains. A recent prescribed fire killed the tops of 70 percent of all laurel under 0.5 inch d.b.h. and 70 percent of the rhododendron under 1 inch d.b.h. Seventeen months after the burn, almost all of the top-killed laurel and rhododendron have resprouted; but many of the white pine planted after the burn will also survive.

INTRODUCTION

Mountain-laurel (*Kalmia latifolia* L.) and rosebay rhododendron (*Rhododendron maximum* L.) are large shrubs that present problems in timber management on millions of acres in the Southern Appalachians. Sometimes found in single clumps, laurel and rhododendron usually occur in dense thickets which reach heights of 10 feet or more (figures 1 and 2). Because of the size and density of the thickets, it is difficult to secure tree regeneration on the same areas. Except where aesthetic values are a consideration, control or eradication is often desirable.

Pure laurel thickets generally grow on upper slopes where chestnut oak and scarlet oak are the main timber species. Control of the laurel is essential before these sites can be reforested. White pine in particular offers a good possibility for timber production on these upper slopes, and Virginia pine or shortleaf pine are also capable of giving a relatively good yield. On the other hand, pure rhododendron thickets, which thrive on well-drained acid soils in cool, moist locations, generally occur on shaded lower slopes and along streambottoms where high quality hardwoods such as yellow-poplar and northern red oak will grow. Although the two species often occur in separate thickets, they also grow in mixtures throughout the Southern Appalachians.

Attempts in 1950 to control laurel and rhododendron by mechanical means were successful, but the cost was high.[1] Sluder's research in 1955 with foliar and basal sprays and other techniques was generally unsuccessful.[2] More recently, Yawney was able to kill rhododendron with a basal spray of 2,4,5-T, but costs ran about $137 per acre.[3]

Other than the work by Keetch[4] there has been little documented evidence of intentional burning in the mountains. Keetch found that a good stand of oak sprouts was formed after one to three burns. His study also showed that burning encouraged the growth of legumes and thereby improved game food.

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[1]Wahlenberg, W. G. From brush to pine. South. Lumberman 180(2261): 40-41, illus. 1950.

[2]Sluder, Earl R. Control of cull trees and weed species in hardwood stands. U. S. Forest Serv. Southeast. Forest Exp. Sta. Pap. 95, 13 pp. 1958.

[3]Yawney, Harry W. Control of rhododendron by basal spray. U. S. Forest Serv. Northeast. Forest Exp. Sta. Res. Note 132, 7 pp. 1962.

[4]Keetch, J. J. Sprout development on once-burned and repeatedly-burned areas in the Southern Appalachians. U. S. Forest Serv. Appalachian Forest Exp. Sta. Tech. Note 59, 3 pp. 1944.

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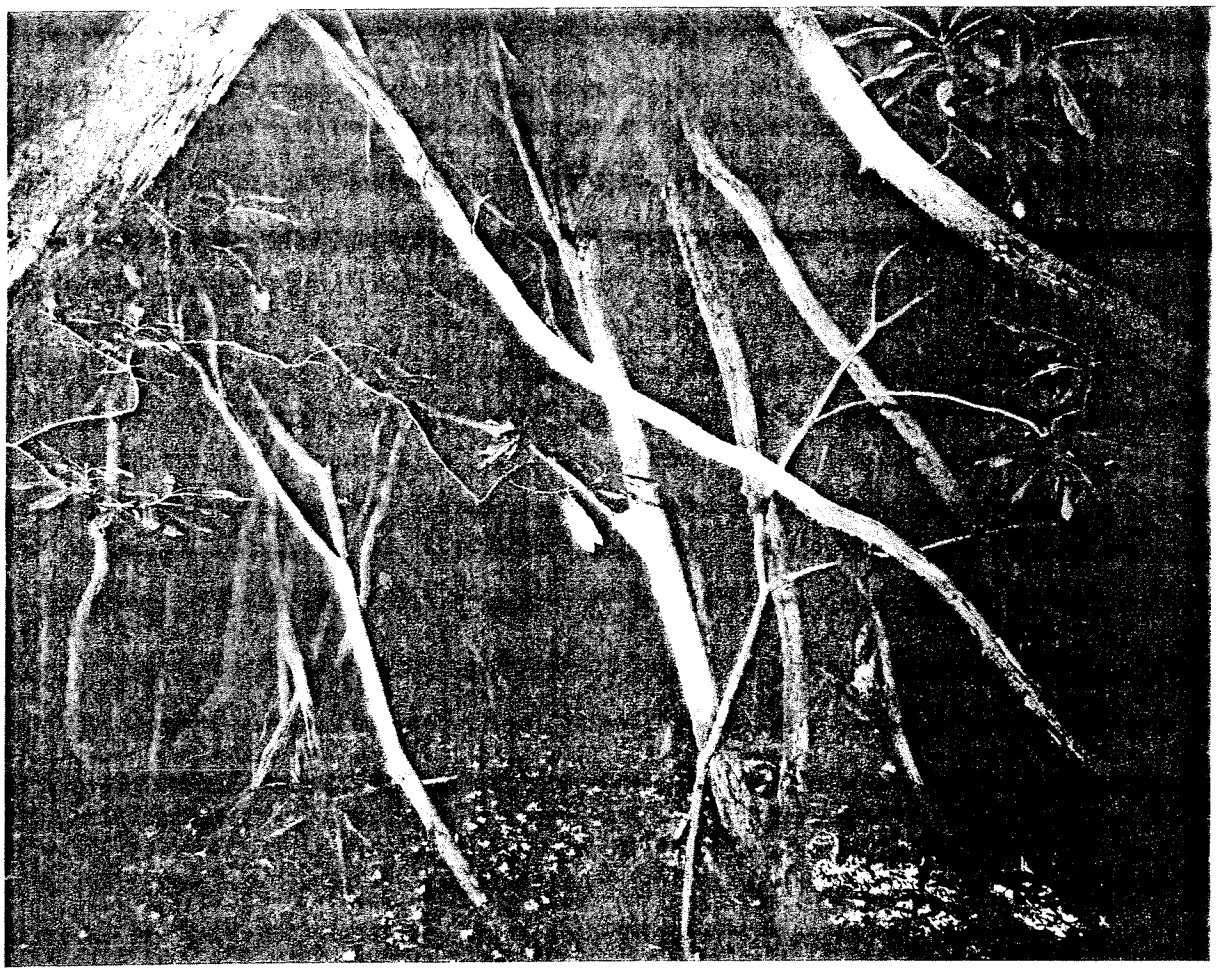

Figure 1. – Typical rhododendron thicket.

This paper reports the results of a fall prescribed burn in laurel and rhododendron thickets on a steep north slope in the Southern Appalachians.

METHODS

An area of approximately 8 acres on the Bent Creek Experimental Forest near Asheville, North Carolina, was selected for the prescribed burn. The area has a northerly aspect and a slope of about 40 percent. The overstory was mixed oak and pine 50 to 75 feet tall and about 150 years old. The understory was mostly laurel and rhododendron. Laurel 8 to 10 feet tall predominated on the upper slope; mixed laurel and rhododendron 8 to 12 feet tall predominated on the middle slope; and rhododendron 10 to 15 feet tall predominated on the lower slope.

Before the burn, 100 laurel and rhododendron stems were selected from the three portions of the slope. These individuals were measured, numbered, and tagged. Observation of these sample stems at various time intervals after burning provided the basis for judging the effectiveness of the fire.

Ten 1/40-acre plots were also located well within the perimeter of the burn area. The following measurements were made on each plot before the burn and 6 months and 18 months after the burn: litter depth, soil pH, fuel conditions, and the number and type of stems by size class.

The results of previous fires over several years had revealed that, to be successful, burning on north slopes must be done on a day with a wind of 4 to 10 miles per hour, a

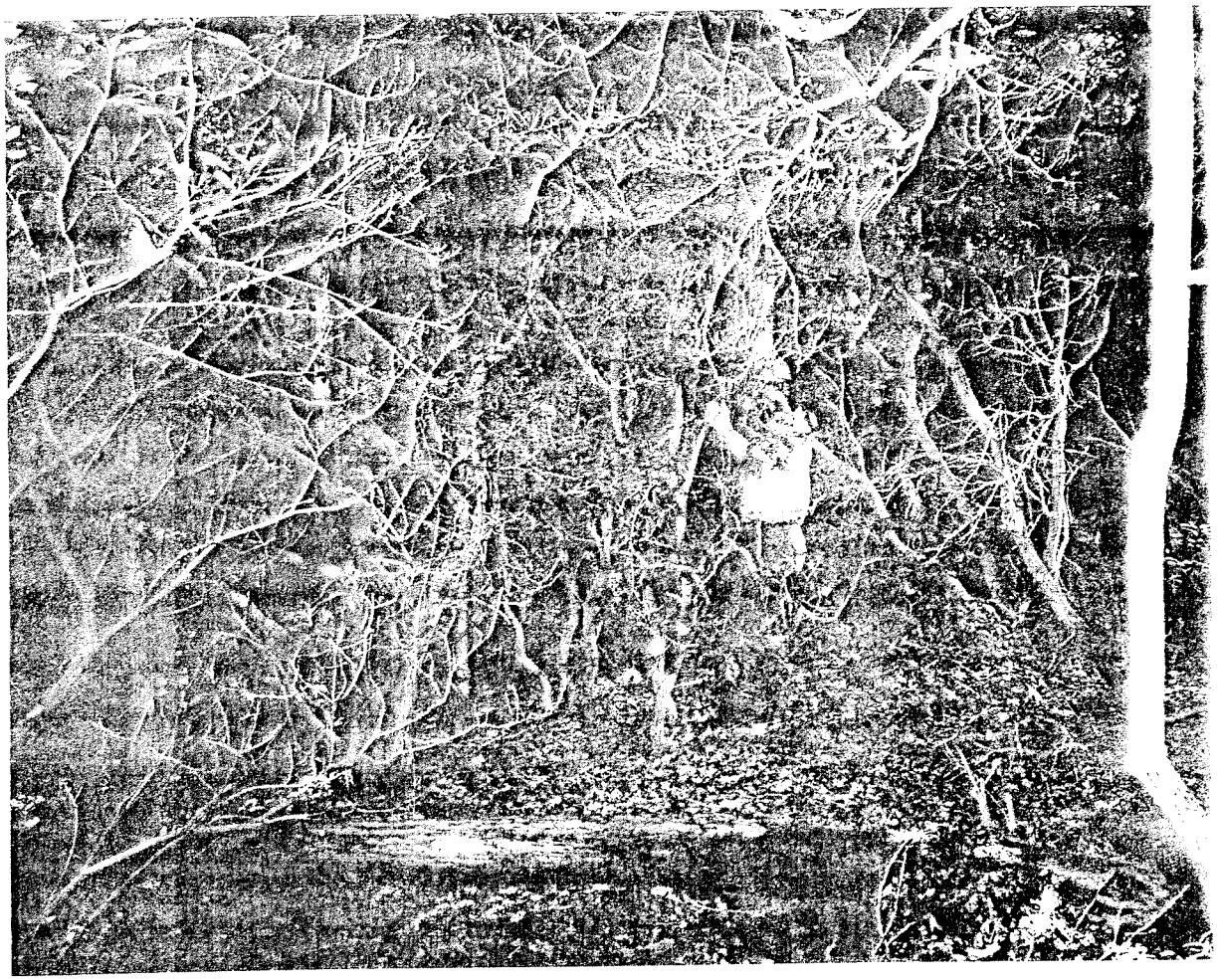

Figure 2. – Typical laurel thicket.

high spread index, and a high build-up index. With this in mind, the fire was set at 1:00 p.m. on December 8, 1965, a class 5 day with a spread index of 58 and a buildup index of 64. The wind, which was out of the north, was blowing up the slope at 13 miles per hour. Backfires were set along the top of the ridge and flank fires were set along both sides of the site. After these fires had burned far enough inward to be safe, a head fire was set at the foot of the ridge.

The fire was excellent for our purpose, burning hot and steady. Approximately 80 percent of the area was burned with the head fire, 15 percent with the backfire, and 5 percent was left unburned.

In March, 3 months after the burn, the area was planted with 2-0 white pine seedlings. Because it was necessary to kill the overstory without damaging the study plots, the overstory trees of merchantable size were injected with 2,4,5-T in July 1966.

RESULTS

The sample stems of laurel and rhododendron were examined in June 1966 and May 1967 (figures 3 and 4). These examinations showed that the smaller stems were more severely damaged by the fire than were the larger stems (fig. 5). A high percentage of both laurel and rhododendron stems was completely top-killed 4 months after the burning (table 1). However, 18 months after the burning, many of these plants had recovered somewhat and had put forth a few leaves.

Figure 3. – Small rhododendron stem after burn.

Figure 4. – Dead laurel after burn.

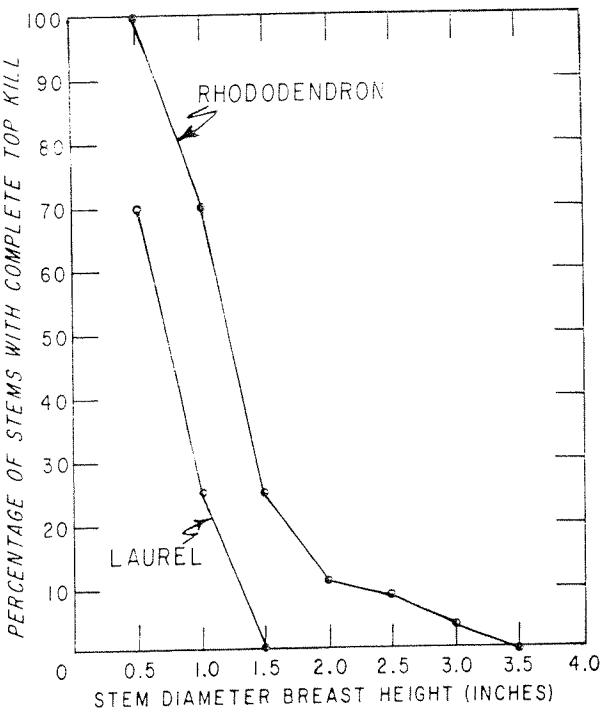

Figure 5.–Percentage and diameter of laurel and rhododendron stems with complete top kill 18 months after burning.

Although the fire was more effective on small rhododendron than on small laurel, most of the rhododendron was larger than 1½ inches d.b.h. and most of the laurel was smaller than 1½ inches. Because the fire was ineffective against the larger stems, more laurel than rhododendron was severely burned or had complete top kill.

On this particular site, the backfire apparently did not generate enough heat to cause the desired kill. As a result, far more stems remained on the backfired area than on the head-fired area.

Almost all the laurel and rhododendron stems on the plots sprouted after the fire. These sprouts will play an important role in the future of the stand as they compete with the planted white pines and natural seedlings. Currently, the planted white pine appear to be growing well.

Examination of the 10 sample plots in June 1966 and May 1967 showed that the fire affected stems other than laurel and rhododendron. The number of these stems increased greatly after the burn (table 2). Some

Table 1.--Percentage of damaged laurel and rhododendron stems 4 and 18 months after the burn

Degree of damage	Laurel stems		Rhododendron stems	
	4 months after burn	18 months after burn	4 months after burn	18 months after burn
	Percent			
Complete top kill	56	11	30	16
Severely burned	27	70	28	40
Lightly burned	13	18	36	40
None	4	1	6	4

Table 2.--Number and size of woody stems, other than laurel and rhododendron, before and after the burn[1]

Size or type	Stems before burn	Stems 6 months after burn	Stems 18 months after burn
	Number/acre		
Less than 1 inch tall	3,624	6,048	68
1 to 2 inches tall	548	332	84
2 to 5 inches tall	940	304	4,040
Over 5 inches tall	0	0	710
Sprout clumps	0	1,204	2,888

[1]Includes yellow-poplar, shortleaf pine, oak, and various shrubs.

desirable species that were scarce before the burn, such as oaks, are now plentiful.

Careful observation of the soil on each plot does not as yet indicate that the fire has adversely affected the site. Bare ground was exposed in only a few places where the fire was hottest, and these spots were soon covered with new litter. The pH of the surface soil increased slightly after the fire but returned to its previous level 18 months later.

DISCUSSION

The results of this experiment indicate that burning can be a useful tool for temporary control of laurel and, to a lesser extent, can possibly be used for rhododendron control. In both cases there are problems that need further attention. Because of the high fire rating required to burn north slopes effectively, there is always danger that the fire will escape. The precautions necessary to insure containment of the fire under these hazardous conditions will, of course, considerably increase the cost of the burn.

The success of the prescribed fire will depend to a great extent on timing. Ideally, the burning should be done in the fall, the timber harvested in the winter, and the seedlings planted in the early spring. A late spring fire might give better kill of laurel and rhododendron, but fire at that time would give the sprouts a full year's headstart on the seedlings to be planted the following year.

It is too early to draw final conclusions about the future of prescribed burning in the mountains or even about the effectiveness of the particular burn reported here. However, the planted white pine are growing well, and all indications point to a new tool for the mountain silviculturist.

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