HAROLD H. BISWELL

Danger of wildfires reduced by

Prescribed Burning

in ponderosa pine

Above—Before prescribed burning. Forests of this sort are extreme fire hazards in late summer when the large quantities of fuel are tinder dry.

Below—After prescribed burning. Wildfire danger has been greatly reduced by prescribed burning in February.

Wildfires are the biggest problem in the management of wildland resources in California.

Californians spend annually more than $25 million on wildfire prevention and suppression and, in addition, annually lose many millions more in flaming timber and damage to watersheds, dwellings, forage, wildlife, and loss of recreational areas. Large quantities of fuels accumulated in many places become tinder dry near the end of the long, hot, nearly rainless summer season and seem to explode when caught on fire. Efforts to stop the fires soon become almost hopeless until the weather changes.

Studies in ponderosa pine in Lake County and in Madera County have shown that the hazard of wildfires can be reduced by prescribed burning in the winter months. Prescribed burning changes the structure and quantity of fuels so wildfires are less damaging and are much easier to control.

Prescribed burning in the Lake and Madera counties studies consisted of broadcast burning followed by cleanup burning. Broadcast burning is not done until enough rain has fallen to wet the duff to the mineral soil. The top pine needles dry in a day or two after rain and are ready for prescribed burning. The soil is always wet or moist. The pine needles are raked to one side to clear a swath 3′ or 4′ wide. The fire is set at the edge of the needles on the upper side of the area to be burned.

Records of Lake County burns for five years showed 47 to 74 days per season—from October 1 to April 1—when conditions for broadcast burning were ideal, neither too wet nor too dry. A broadcast burn reduces the wildfire hazard by destroying much of the flash fuel as well as many logs, stumps, and other material. It was estimated that a single broadcast burn might reduce the fire hazard in some places by as much as 75%.

Cleanup burning follows broadcast burning and gets rid of the remaining coarse fuel material as it is piled in small heaps and burned. Cleanup burning is mainly labor and can be done under a wider range of weather conditions than broadcast burning. One man can pile and

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Wildfire Fuel Accumulated Six and Eight Years After a Prescribed Burn
(Pounds per acre of oven dry material)

Years	Thinned plots					Unthinned plots			
	1	2	3	4	5	1	2	3	4
1952–58	1,925	0	0	1,713	0	2,799	2,574	6,326	8,193
1958–60	0	24	0	3,378	0	618	1,523	2,178	689
Total 1952–60	1,925	24	0	5,091	0	3,417	4,097	8,504	8,882

Left—Thinning to about proper stocking and pruning—prunings burned—in such stands reduces the fire danger to about the maximum possible for a full stand of trees. *Right*—When the wildfire danger is reduced by cleaning out the dead fuel it recovers slowly, chiefly through accumulation of dead material from mortality of suppressed trees. In this spot there were about 1,100 trees per acre—far too many for trees of this size.

E. L. Proebsting, L. Tichinin, A. Greathead, and H. Hall

Fertilizer trials with

Shasta and Lassen

strawberry varieties in three producing areas

Nutritional requirement studies of strawberry varieties Shasta and Lassen suggest that field behavior of strawberries in the major areas of California production is closer to the behavior of deciduous fruit trees than to annuals.

One of three sets of field trials was established on Sorrento soil south of San Jose. Six plots of nine beds 40′ long were given differential fertilizer treatments with the fertilizer placed on the beds and the beds retilled. After soil fumigation with chloropicrin, Shasta strawberry plants were set out in the fall.

The six fertilizer treatments were: 10–10–10, complete, at a rate of 1,000 pounds per acre; ammonium sulfate at 500 pounds; potassium sulfate at 185 pounds; ammonium sulfate at 1,000 pounds; treble superphosphate at 230 pounds; and the grower's treatment of 500 pounds of 10–10–10 per acre followed later by 200 pounds of 16–20.

Leaf samples for analysis were taken at approximately monthly intervals through the growing season. Each sample consisted of 100 leaflets from leaves which had recently attained full size. Some petiole samples were also taken for comparison. Total and nitrate nitrogen, phosphorus, potassium, calcium, magnesium and manganese were determined for all samples.

Yields were recorded for all pickings in the test years of 1958 and 1959.

Analyses of leaflets and petioles illustrated the differences found in the two tissues, the changes due to time of sampling, and the relative utility of total nitrogen compared with nitrate. The petioles were much higher in potassium than the blades. The application of potassium sulfate at the rate of 100 pounds of potassium per acre per year, whether applied as a simple or with 10–10–10, was not reflected in the potassium content of either blades or petioles. Variability in potassium was high.

Calcium content was similar in blades and petioles, and showed little difference among plots. Variability was higher in the samples taken in late summer than in the earlier samples.

Magnesium, also, was much the same in all the determinations.

The phosphorus content seemed to average slightly higher in the blade than in the petiole. There was no apparent uptake of phosphorus from application of 100 pounds of phosphorus per acre per year from treble superphosphate, nor from the same amount of 10–10–10. The values found in late summer were slightly greater than those in the spring.

Manganese ran substantially higher in the blades than in the petioles, but also was much more variable in the blades. In the absence of deficiency symptoms, the levels found are considered adequate.

Total nitrogen was about three times higher in the blades than in the petioles. The reverse was true with nitrate. Furthermore, the differences between treatments were far larger with the nitrates in the petioles than in the blades. It required more than 100 pounds of nitrogen to maintain the nitrogen level throughout the season. A split application gave higher nitrogen content late in the season than a single application.

The lowest yields produced were in the 1958 plots lacking nitrogen. The highest yields in the 1958 tests were in the plots receiving the highest nitrogen. In 1958 and again in 1959 the grower-treatment fell a little behind the nitrogen alone, but differences were not great.

A second set of plots was established near Santa Maria on Pleasanton soil. The area was unirrigated grain land prior to grading for strawberries.

Lassen plants were set out in December and fertilized the following Febru-

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PRESCRIBED BURNS

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burn about 1,000 pounds of dead material per hour.

The technique of prescribed burning is well developed but each process takes time and costs money. To learn how fast wildfire fuel accumulates, dead fuel material—other than pine needles—accumulated over a period of eight years following prescribed burn in 1952—was measured by weight. The measurements were made on nine plots, 60′ × 60′ square. The trees on five of the plots had been thinned before the burn in 1952. Three of the five plots were thinned to about proper stocking and the other two plots were overthinned. The remaining four plots were unthinned. The trees on the thinned plots were pruned so that the lowest branches were 22′ above the ground cover of pine needles and herbs. Only the trunks of trees connected the ground fuel layer with the green canopy. The pruning further altered the fuel supply and the danger of wildfires was reduced beyond getting rid of dead materials only.

Dead wood was removed from the plots and weighed after six years of accumulation and again after two more years. The dead material consisted entirely of small suppressed pine trees and limbs more than 1″ in diameter on the ground.

The new accumulated dead fuel consisted entirely of small suppressed trees. In the properly thinned plots where the suppressed trees were removed, no fuel accumulated in two instances and only 24 pounds per acre in the other. Even in the unthinned plots where the trees were very dense—up to 1,100 per acre—the fuel accumulated slowly.

The beneficial effects of prescribed burning to reduce wildfire dangers can last for many years and when the cost is divided by the years of benefit obtained, the cost per year is relatively low.

Harold H. Biswell is Professor of Forestry, University of California, Berkeley.

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