A SPRINKLER SYSTEM FOR USE IN PRESCRIBED BURNING

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INTRODUCTION

Prescribed burning is feasible over a wide range of weather conditions; however risk of fire escape increases as fuels dry and wind velocities accelerate. As additional precautions are employed the cost of preparing, executing, and extinguishing prescribed fires also increases. This report describes a sprinkler system that will reduce escape risk, and therefore cost, of many prescribed burns, especially those conducted under higher hazards.

Previous application of the sprinkler-system concept to prescribed burning is documented by Orr and Dell (1967) and Henderson and King (1968). They describe the use of a pipe tee, a faucet, a short garden-hose, and a pipe mast to adapt on oscillating sprinkler head to standard 1 1/2-inch fire hose. Their unit, however, is substantially bulkier than the sprinkler described here.

During the summer of 1969 and 1970, fifteen 1-acre blocks of lodgepole pine slash, 50 miles west of Calgary, Alberta, were burned during low, moderate, high, and extreme fire hazard. To supplement other precautions

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a sprinkler system was designed and assembled at field headquarters. It was used throughout the burning program to:

1. Ease the workload required for wetting plot perimeters prior to burning,
2. Reduce spotting from smoldering blocks prior to post-burn measurements,
3. Aid mop-up crew in extinguishing the fire after post-burn measurements,
4. Wet previously burned areas during extended drought or high winds in the event of surfacing "sleepers".

DESIGN OF SPRINKLER UNIT

Use of a sprinkler for fire control requires a simple means of adapting it to the 1 1/2-inch fire hose. The sprinkler head should have adjustable controls for both flow and arc. Figure 1 illustrates a Buckner 512M rocker-jet head and modifications for use in fire control. Male and female brass couplings are welded to a short piece of steel pipe (1 1/2" x 9") so that the sprinkler unit can be connected to any convenient junction along the fire line. A 3/4-inch bushing inserted at the centre of the pipe allows the sprinkler head to be screwed in directly or raised by a short mast for extra stream height. The complete unit weighs about 5 lbs and is stabilized by a flat iron base extending perpendicular to the direction of the hose[3]. Present cost of materials for an individual unit is itemized below:

Sprinkler head	$14.02
3/4-inch bushing	0.40
1 1/2-inch male and female couplings	4.45
1 1/2-inch connecting pipe	0.75
Flat iron base	0.35
Total cost	$19.97

[3] A lighter prototype with plastic pipe and couplings is being designed at the time of writing.

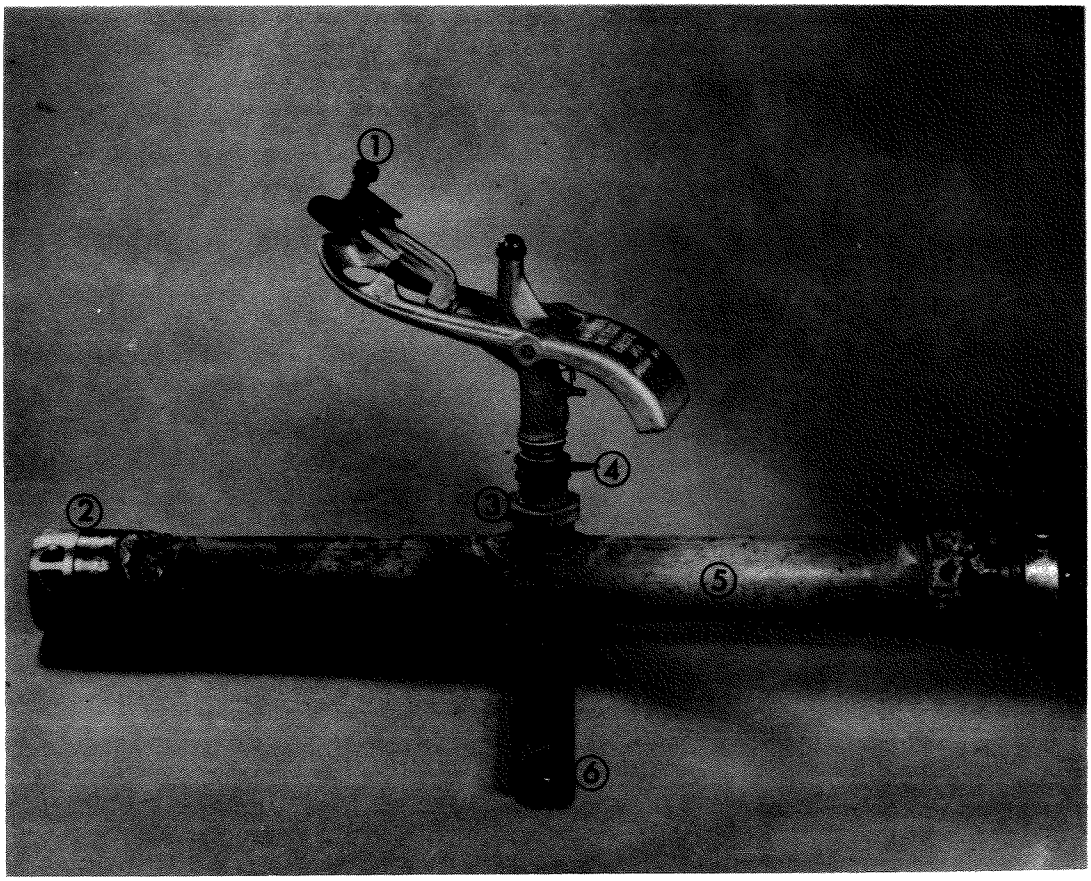

FIGURE 1. FIRELINE SPRINKLER UNIT

1) Flow control; 2) Female coupling; 3) 3/4-inch bushing; 4) Arc control; 5) Connecting pipe; 6) Stabilizer bar; 7) Male coupling; 8) Blanking cap (used on end sprinkler unit).

APPLICATION

Water application rates and equivalent stream radii are given in Table 1 for a range of pressures and orifice sizes. When used with 100-ft hose lengths a radius of 53 ft provides sufficient overlap. Figure 2 illustrates the sprinkler design for a 1-acre block isolated from surrounding slash by 20-ft firelines bulldozed to mineral soil. For additional protection from firebrands, sprinkler units wetted slash, particularly downwind. Height of stream was adequate without inserting a riser between the connecting pipe and sprinkler head. Consistent and uniform water application is achieved which creates a cooled and moistened barrier that discourages spotting with minimum effort and personnel.

Since much of the area surrounding a burning block is obscured by heavy smoke for lengthy intervals, the remote operation of sprinklers is particularly advantageous. Personnel can remain outside of irritating smoke until it is reduced to a tolerable level and hand tools and nozzles can be employed. Nozzles and sprinklers are quickly interchangeable and with proper placement of siamese valves they can be used simultaneously.

Figure 3 illustrates the use of the sprinkler system for mop-up or wetting of previously burned areas during extreme drought or high winds. Flow rates are conservative and only one man is required to patrol lines and operate the pump. This is especially helpful for nightshift arrangements.

For larger blocks, we found that a Wajax Mark III could easily support five sprinkler units on 700 ft of "weeping" or unlined hose, strung up a 20% slope. Use of rubber lined hose, level terrain, or tandem

pump hook-up could extend the system for use on most operational prescribed burns and perhaps some wildfires.

Limitations of the system are recognized. Steep terrain or appreciable distance to water renders the sprinklers useless. Excessive mud in the water could continually clog the orifice, and flow rates may be too low in some cases. On the basis of our field tests, however, the sprinkler system did prove extremely valuable during experimental burning of small blocks over a range of fire hazards. Conservation of water and manpower, simplicity, portability, and low cost suggest a potential use on operational prescribed burns and wildfires.

From the experience gained during the research burns the following recommendations are made:

1. Maximum use of rubber-lined hose,
2. When working with dirty water use an additional screen over intake hose to avoid orifice plugging.

REFERENCES

Henderson, R.C., and R.K. King. 1968. Sprinkler system eases control of prescribed fires. The Truck Logger 24 (9): 16, illus.

Orr, W.J., and J.D. Dell. 1967. Sprinkler system protects fireline perimeter in slash burning. Fire Control Notes 28 (4): 11, illus.