

Do Wire Fences Stop Ground Fires?

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ABSTRACT: Five meshes (1/8 to 1 inch) of 16-gauge steel wire fences, 3 feet high, were tested as possible ground fire barriers in 4 fuel types. The 1/8-inch mesh stopped only 1 test fire but retarded others; 1/4-inch mesh retarded some. The results suggest that further trials may be worthwhile.

Japanese researchers have reported some success in stopping fires with wire screens.¹ Urban firemen have used wire screens as face guards when approaching flaming buildings. Wire

screens are placed around miners' headlamps and across ducts to prevent passage of flame. A major fire-control problem in the western United States is inaccessibility and long travel time to fires. If wire screens or fences could stop fires, or--particularly on fuel-breaks--retard them until fire crews arrived, costs of installing and maintaining fences might be justified. Wire fences might also be used as a barrier from which to backfire.

To see whether selected meshes of wire fence will stop or retard ground fires, we started a feasibility study in 1963. On the Stanislaus National Forest 40 plots, 8 x 40 feet in size, were laid out in cured annual grass, pine needles, bear clover (*Chamaebatia foliosa*), and manzanita brush (*Arctostaphylos viscida*). There were two replicated plots in each fuel type. Five screens of 16-gauge wire in 1/8-, 1/4-, 1/2-, 3/4-, and 1-inch mesh 3 feet high were stretched across each plot at its center and supported by steel posts. The bottom of each length of screen was buried in the ground as recommended by Nakamura et al.¹ The terrain in all plots was flat.

First burning tests were done in bear clover, pine needles, and brush under high fire danger conditions in early December 1963. Each plot was burned independently and was ignited at the same point with drip torches. Time-sequence movies and colored slides were taken of each burning. Close observations of each burn were made and recorded. Because of a sudden change in weather,

¹Nakamura, S., Hukuda, R., and Matumoto, T. [Whether a wire screen could break down a brush fire (preliminary report).] Matsue, Japan, Shumane Agr. College Bul. 9A-2: 71-74. 1961. (Forestry Abs. 24(2):443 (No. 3828).) Transl. U.S. Forest Serv. Pacific SW. Forest & Range Expt. Sta.

the burning of grass test plots was postponed until 1964, when they were burned on a high fire danger day in July.

RESULTS

One fire in bear clover was stopped by the 1/8-inch mesh steel screen, apparently because of the screen's barrier effect. The second fire in bear clover was not stopped. None of the other fires stopped at the screen.

In all burns testing the 1/8-inch screen and in some burns with the 1/4-inch screen, the flame was changed noticeably as it approached the screen. The flame slowed down as if approaching some unseen barrier, then stopped momentarily about 2 inches from the screen. It then curled back. Suddenly the "invisible barrier" seemed to disappear; the flame once again moved forward, toward the screen, and into the fuel on the opposite side. When the grass plots were burned, the grass on the unburned side of the fence seemed to burst into flames before the main flame front passed through the screen.

DISCUSSION

A wire fence probably has three main effects on ground fires.² It acts simply as a barrier to the fire, it slows gas flow, and it intercepts radiant heat.

Part of the action exhibited by the fire--slowing, stopping, and curlback--may have been due to the aerodynamic effect of the screen as it slowed and smoothed gas flow. As soon as the screen became sufficiently hot, however, all barrier effects were broken down, and the flame passed through it to the fuel on the other side.

A SECOND TEST

Because of the noted temporary effect of the 1/8-inch screen on the behavior and spread of fires, a second series of similar tests was conducted in the same fuel types with the 1/8-inch mesh screen. New 3-foot screen sections were bent in an inverted "V" fashion, producing a 1 1/2-foot double barrier joined at the top.

We speculated that the first barrier would slow airflow and intercept heat as the fire passed through and that convective cooling in the space between barriers might maintain the effectiveness of the second barrier. Since the barriers were joined at the top, leaves and other flammable debris would not collect between them. Results of these tests were almost identical to the first.

CONCLUSIONS

Although the 1/8-inch, 16-gauge steel wire screen, when used as a fire barrier, affected the behavior and spread of ground fires in lighter fuels, it did not significantly retard or stop fires on high fire

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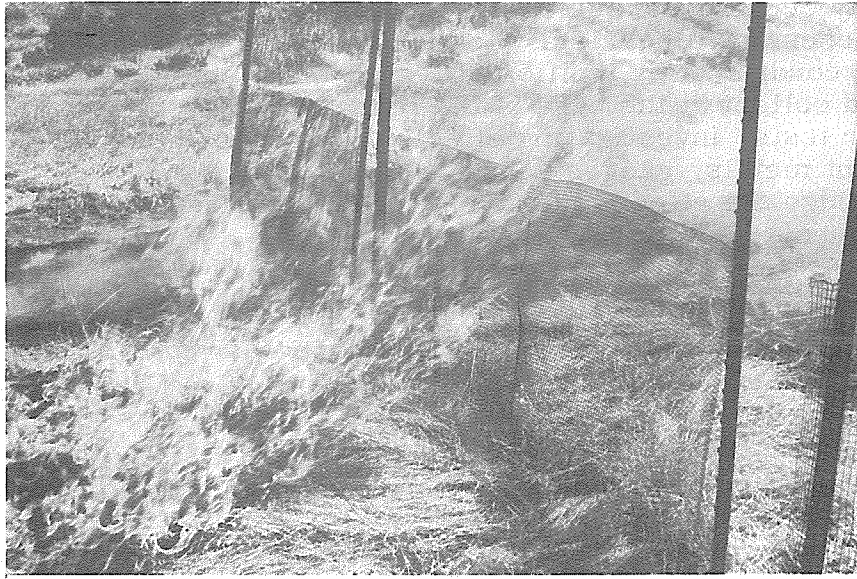


Figure 1.--Fire fence trial in grass, 1/4-inch and 1/2-inch screen;
the fire passed through the screen.



Figure 2.--Fire fence trial in bear clover, 1/8-inch screen.
Note "barrier" effect of screen.

danger days. Screens of larger mesh did not stop ground fires. Failure may occur because heating of the screen soon breaks down its effectiveness as a barrier. Heating effects might be compounded under field conditions by ignition of leaves and flammable debris which could collect at the base of the fence. The results suggest that further tests, investigating effects of smaller-mesh screens and different metals, gauges, and screen arrangement, will be necessary to judge the effectiveness of wire screens as fire barriers under California conditions.

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