moisture computed. Rate of fire spread was estimated by placing firecrackers 10 ft apart in the direction of anticipated fire movement and timing the interval between explosions. Soil temperatures during burning were recorded with a complete range of temperature-indicating pyrometric material (Tempil) placed on the soil surface in the center of each quarter of each treatment plot. Ambient temperature and relative humidity were measured as each plot was ignited.

Initial burns, under "wet" conditions, were conducted 8 hours after the passage of a cold front which deposited 0.16 inch of rain. Fuel moisture conditions for the "intermediate" and "dry" burns occurred 2 days later, in the morning and afternoon, respectively. Headfires were used, and all plots receiving the same treatment were ignited simultaneously.

Legumes were counted the following summer on 10 randomly located 9.6-ft² samples on each subplot. Data were subjected to analysis of variance and significance tests at the 90% probability level.

Results and Discussion

Rate of fire spread was directly related to wind speed and inversely related to fuel moisture content. Temperatures generated at the soil surface by fires were also inversely related to fuel moisture content and relative humidity (Table 1). Fuel consumption was greatest when the moisture content of the fuels was less than 16%. When fuel moisture contents exceeded 30%, coarse fuels such as pine cones and branches were completely scorched and pine straw beneath these fuels was left unburned.

Although distinctly different burns were obtained, legume responses were not correspondingly different. The number of sensitive partridgepea plants and other leguminous species did not differ significantly between treatments (Table 2). Plant numbers were not increased by the broadcast seeding of unscarified partridgepea seed.

Table 1. Rate of fire spread and temperatures generated at the soil surface under three burning conditions.

<table>
<thead>
<tr>
<th>Burning conditions</th>
<th>Fuel moisture (%)</th>
<th>Ambient temp. (°F)</th>
<th>Wind speed (M PH)</th>
<th>Relative humidity (%)</th>
<th>National fire danger rating</th>
<th>Rate of fire spread (ft/sec)</th>
<th>Temperature generated at the soil surface (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet</td>
<td>31.9</td>
<td>70</td>
<td>13-18</td>
<td>73</td>
<td>17</td>
<td>0.7</td>
<td>200-300</td>
</tr>
<tr>
<td>Intermediate</td>
<td>15.8</td>
<td>60</td>
<td>8-12</td>
<td>41</td>
<td>19</td>
<td>0.9</td>
<td>275-375</td>
</tr>
<tr>
<td>Dry</td>
<td>7.2</td>
<td>73</td>
<td>8-12</td>
<td>25</td>
<td>19</td>
<td>1.1</td>
<td>350-450</td>
</tr>
</tbody>
</table>

Fuel moisture contents under a range of field burning conditions directly influenced the time-temperature exposure of seed at the soil surface. Calculations indicate that field burning produced conditions which were similar to those which increased the germination of partridgepea seed in previous laboratory work. While we did not measure germination, our treatments did not affect the number of mature legumes 6 months after treatment.

The lack of plant response, even when partridgepea seeds were sown in conjunction with our treatment, suggests some limiting factor within the environment or some competitive interaction among or between plants which limits overall population size. The study did not define the nature of this factor or interaction, but it did show the need for more detailed observations following fire to isolate those components which determine the population size of mature legumes.

Literature Cited


Herbage Disappearance and Grazing Capacity Determinations of Southern Pine Bluestem Range

H. A. PEARNON

Highlight: Herbage disappearance per animal unit day in yearlong grazing on southern pine range averaged 38.47, and 38 pounds on lightly, moderately, and heavily grazed range. Cattle intake accounted for only 36 to 47% of the disappearance, factors such as trampling, weather, and wildlife accounted for more than 50%. To sustain light, moderate, and heavy grazing intensities yearlong, about 115, 100, and 70 pounds of herbage were required per animal day. Seasonal grazing only required 75 and 40 pounds for moderate and heavy stocking.

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Grazing Capacity

In prior studies, utilization (herbage disappearance) averaging 45 to 50% of yearly herbage yield was judged near optimum for maintaining forage on southern pine range (Duvall and Whitaker, 1964; Pearson et al., 1971; Pearson and Whitaker, 1974). For briefer periods, however, utilization substantially exceeding 50% sometimes improves forage value and botanical composition (Duvall and Whitaker, 1964). To sustain light, moderate, and heavy grazing intensities yearlong in this study, herbage required was (after rounding to the next higher 5 lb) 115, 100, and 70 lb/cow day (Table 1). On seasonally grazed range, Duvall and Linnartz (1967) found that herbage disappearance averaged 34 lb/cow day with moderate (46%) and 26 lb with heavy (67%) use. Consequently, cattle required only 75 and 40 lb herbage production per cow day with seasonal moderate and heavy grazing.

If moderate grazing is the management goal, then initial stocking rates could, for practical purposes, be determined by dividing herbage production per acre by requirements per cow day. For instance, each acre of range producing 2,000 lb herbage annually would provide 20 cow days of yearlong grazing but 27 cow days of seasonal grazing. With these stocking rates, forage production would be adequate to supply the requirements for the cattle, deer, and other factors causing disappearance and still provide ample amounts for soil protection and continued plant vigor. Forage yields would have to be assessed for yearly fluctuations and stocking rates adjusted.

**Literature Cited**


