

LOW INTENSITY FIRE PRESCRIPTIONS FOR BRUSH SCULPTING

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It is extremely important to monitor weather while burning, not only for safety reasons but to achieve desired effects on brush. Weather conditions during fires have a profound effect on fire behavior and subsequent response of mesquite to fire. When effects of several winter fires were compared on two north Texas ranches, the Waggoner and Y Ranch, percent of mesquite plants in a stand that were completely topkilled increased with increasing air temperature (Figure 1). Topkill decreased with increasing relative humidity (RH), but this relationship was found only on the Y Ranch and not the Waggoner sites. The Y Ranch sites were dominated by warm-season grasses which were dormant at the time of burning. Fuel moisture of these grasses was subject to changes in RH. In contrast, the Waggoner plots had an abundance of cool-season grasses (Texas wintergrass, Japanese brome) which were green at the time of burning and less affected by changes in RH (Ansley et al. 1998).

Prescription for Low-intensity Savanna Fires

Wright and Bailey (1982) identified the most desirable weather and fuel conditions to produce high intensity mesquite-topkilling fires. However, alternate guidelines are needed if savanna is the management goal. The ideal goal for the low intensity "savanna" fire prescription is to create a fire that is of sufficient intensity to cause partial top-kill and thus reduce foliage, but will also preserve apical dominance in taller trees.

Winter low-intensity fires (January-March) that produced the desired "savanna" effect on dormant mesquite were successfully conducted within fine fuel amount between 1300 and 3000 lb/ac, air temperature between 55 and 68°F, relative humidity between 30 and 50%, and wind speed between 8 and 12 mph (Table 1). A moderate wind speed was needed to move low-intensity flame fronts because fires were conducted under relatively high RH and low air temperatures. Wind speeds of 12-18 mph were used if RH was greater than 40% and air temperatures were less than 60 °F (Ansley and Jacoby 1998).

Often, low-intensity headfires were conducted in mornings, when air temperatures were cooler and RH was higher, than during afternoons. Under lower fine fuels (1000-1500 lb/ac), some savanna fires were successfully conducted in afternoons. Fine fuel below 1000 lb/ac often burned completely, but there was no apparent damage to mesquite foliage. Similarly, backfires produced little effect on mesquite and were not viewed as a desirable means of applying fire for mesquite sculpting. In contrast, herbaceous fine fuels greater than 3500 lb/ac, or RH less than 30% under most fuel amounts generated top-killing fires.

Conditions required for low-intensity headfires are very similar to those recommended by Wright and Bailey (1982) for burning perimeter fireguard areas (i.e., blacklines) prior to burning a large area, with the exception that we desired higher wind speed in order to send the flame front as a head fire instead of a flanking or backfire. Light and variable winds were **undesirable** for winter low intensity headfires.

It is important to note that *only narrow time windows of opportunity exist for low intensity fires* - either early in the morning or late in the evening. Because of these time constraints, one cannot afford to spend a lot of time backfiring fire guards. Blacklines should be burned out several days or weeks earlier so one can apply the prescribed low intensity headfire when air temperature and RH are optimum and can complete such a burn within an hour. To burn the fireguards ahead of time, one must have parallel roads or dozer lines on at least one and preferably two downwind sides of the area to be burned (see Wright and Bailey 1982).

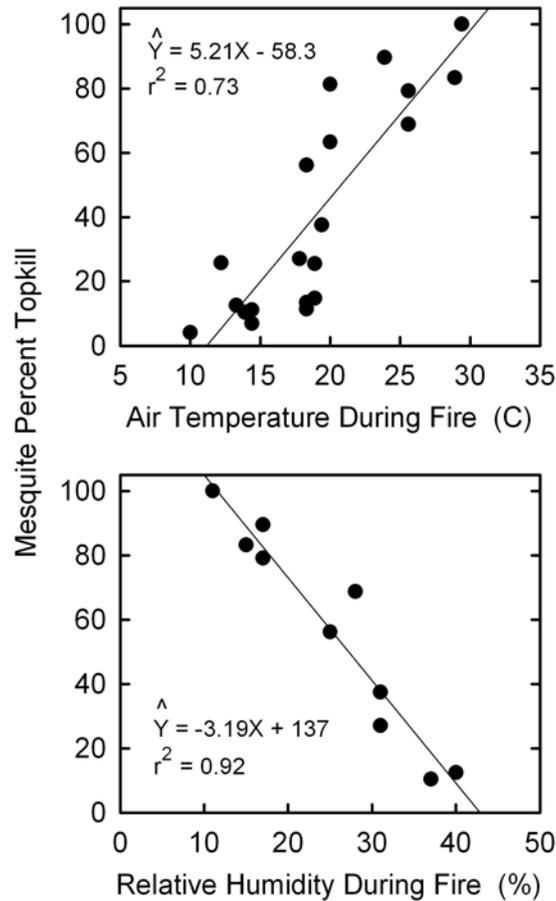


Figure 1. Relationship between air temperature or relative humidity just prior to a fire and percent of mesquite trees in a stand completely top-killed by the fire. Each point represents a different fire. Fine fuel loads of all fires ranged from 2000 to 3500 lb/ac. All fires were first-burn winter fires (adapted from Ansley et al. 1998).

Low Intensity Summer Fires?

Low intensity summer fires may have greater potential than winter fires to reduce mesquite foliage to desired levels, but the risk of complete topkill of the canopy is greater. The time window of opportunity to burn is even smaller with summer fires and is probably limited to only a few hours after sunrise. In most cases a low intensity summer fire can only be accomplished between 7 and 10 AM. Alternatively, a low intensity summer fire could be done on limited acreage after sunset if air temperatures move below 90 F and RH moves above 30%.

Another way to achieve low intensity summer fires is to burn as a backfire. However, this could realistically only be accomplished on very small acreages. One possible advantage of using low intensity fires in summer rather than winter months would be if the management goal was to preserve the mesquite overstory, yet kill prickly pear cactus (*Opuntia* spp.). Prickly pear appears to be much more susceptible to summer than to winter fires (Ansley and Castellano 2007).

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