

## Lampblack for Frost Protection In a Grape Vineyard

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FREEZING temperatures often occur during the early bud and bloom stages in grapes in most grape-producing areas of Arkansas. Therefore we conducted a preliminary test in April, 1974, to evaluate the efficiency of lampblack in giving a few degrees of protection during these critical periods.

The test began on April 4, when there was still a 50% probability of the temperature falling to 28° F. Lampblack was applied at the rate of 25 pounds per acre by a field-spraying apparatus in a grape vineyard on a plot 100 ft wide and 70 ft long.

Temperatures were measured at 12-minute intervals at heights of 4.5, 38, and 55 inches at two locations in the treated and check plot from April 4 through April 19. Five episodes of freezing temperatures occurred during this time. Average temperatures in the check and lampblack plots during the five frost episodes were:

Ht. in inches	Check plot	Treated plot	Differ ence
4.5	30.0	30.2	+0.2
38	32.9	33.4	+0.5
55	33.3	33.9	+0.6

Onset of 32° temperatures averaged an hour later in the lampblack plot than in the check plot. The end of episodes of 32° temperatures in both plots averaged around 7 AM CDT. Thus average duration of freezing temperatures was shorter in the lampblack plots than in the check plot, averaging about 45 minutes less at both 38- and 55-inch heights.

The morning of April 9 was the coldest of the five episodes. On that morning the minimum at the 4.5-inch height was 24.5° in the check plot and 25.3° in the treated plot. The absolute minimum on that morning varied from 26.5° at 55 inches in the check plot to 26.9° at the same height in the treated plot.

Figure 1 presents data showing average hourly temperatures for the five frost episodes for check and lampblack plots at the 55-inch height from 3 AM until 8 AM. The protection given by the lampblack is most evident from 6 AM till 8 AM.

Figure 2 presents hourly temperature data for the morning of April 9. Irregularities in temperature tendencies are more evident on individual nights, when temperature changes of as much as 5° are noted within 12-minute intervals. These sudden temperature rises and falls are usually associated with sudden changes in wind speed and/or cloud cover, not measured in this study.

The period April 4 to 19 was characterized by a series of frontal passages of a rather pronounced nature, with brisk winds and considerable cloudiness. This tends to lessen the efficiency of lampblack, since bright sunshine and light winds make the lampblack more efficient by heating it to higher daytime temperatures.

There were few such favorable occasions during the period of study, but a warm sunny day with little wind did occur on April 9, following the coldest freeze episode. On that day the temperature averaged 3° warmer at 4.5 inches, 2° warmer at 38 inches, and about 1° warmer at 55 inches in the treated than in the check plot. However, wind and cloud conditions the following night allowed minimum temperatures to fall to only 48° and little effect could be noted from the increased heating in the treated plot.

Bud counts on the check and treated plots on April 23 showed no evidence that the lampblack had reduced bud damage, and a visual inspection on August 12 when grape clusters were maturing showed no apparent increase in yield in the treated plot.

This preliminary test suggests that some frost protection can be achieved by applying lampblack to the rows of a vineyard but temperature differences are not spectacular. Significant protection may be noted only if freezes occur when buds are at their most susceptible stage and temperatures do not fall much below 28 degrees.

See graphs next page

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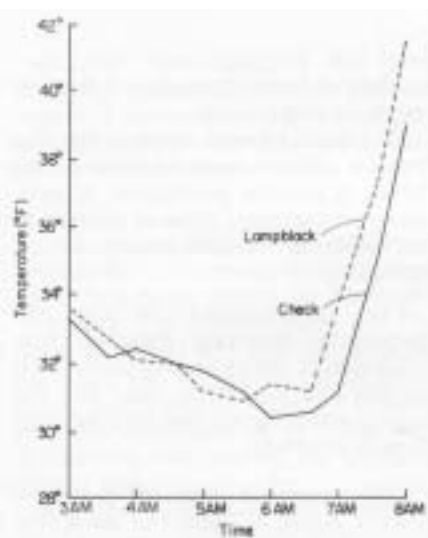


Fig. 1. Average hourly temperatures at 55-inch height for five frost episodes, from 3 AM to 8 AM.

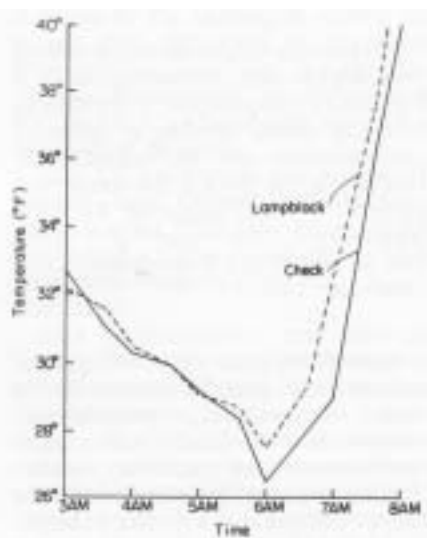


Fig. 2. Average hourly temperature at 55-inch height for the morning of April 9, 1974.