THE CONCORD juice industry has imposed an eight-hour time limit from harvest to plant delivery on mechanically harvested grapes to prevent quality deterioration. Results from 1971 tests (published in Vol. 21, No. 2, of Ark. Farm Research) indicated that it would be possible to extend this limit without loss in juice quality if the grapes were treated with SO2 at harvest.

Research was continued in 1972 to study the interactive effects of rate and time of SO2 application, harvest temperature, and post-harvest holding time on quality of Concord grape juice. Potassium metabisulfite was added to produce SO2 levels of 0, 40, and 80 ppm. Applications of SO2 were made immediately after harvest, 6 hours after harvest, and 12 hours after harvest.

Grapes were harvested at two fruit temperatures (75°F and 95°F). This was accomplished by hand harvesting grapes at 75°F in the early morning, and at 95°F during the heat of the day. The grapes were packaged in 2-pound polyethylene bags and crushed (to simulate the damage sustained by the fruit during the mechanical harvesting operations), and then held in temperature-controlled rooms adjusted to 75°F or 95°F throughout the post-harvest holding period.

Samples were removed for quality analysis after storage for 6, 12, 18, 24, 30, 36, or 42 hours. The samples were analyzed for percent alcohol, volatile acidity, percent soluble solids, titratable acidity, and color as determined by percent transmittance of light at 520 nm through the juice.

Both temperature and SO2 level had a highly significant effect on all quality variables determined (see table). Grapes harvested when fruit temperature was high produced more alcohol and more volatile acid, consumed more sugar while forming alcohol, produced more titratable acidity, and had less intense juice color than did those harvested at the low fruit temperature.

SO2 reduced alcohol formation, increased volatile acid (probably due to formation of sulfurous acid which was detected along with acetic acid), maintained soluble solids at the high SO2 level, resulted in a slight acid reduction at the high SO2 level, and improved juice color.

When grapes were mechanically harvested at high temperatures and the holding period was extended to longer than 8 to 12 hours, applying SO2 to the grapes at the rate of 80 ppm reduced alcohol formation to the level of the untreated checks held at 75°F (Figure 1). There seems to be no need for applying SO2 when the fruit temperature at harvest is low (75°F or below). However, high temperatures can occur during the maturation season for 'Concord' grapes in Arkansas.

When grapes were mechanically harvested at high temperature and the SO2 was applied initially or within the first six hours, formation of alcohol was significantly less than when applications were delayed until 12 hours after harvest (Figure 2). However, this advantage was lost when the post-harvest holding period was extended.

If 'Concord' grapes are mechanically harvested when fruit temperatures are high and the grapes are likely to be held for longer than 8 to 12 hours before processing, immediate application of SO2 to the fruit at the rate of 80ppm will maintain fruit quality.
Fig. 1. Effect of \( \text{SO}_2 \) Treatment on Alcohol Formation in Concord Grapes Harvested and Held at 95°F and 75°F.

Fig. 2. Effect of Time of \( \text{SO}_2 \) Application on Alcohol Formation in Concord Grapes Harvested and Held at 95°F and 75°F.