Grape Juice: Influences of Preharvest, Harvest, and Postharvest Practices on Quality

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INTRODUCTION

The first grape juice known to be processed in the United States was used for the sacrament on the Communion table of the Vineland, New Jersey Methodist Church in 1869. This juice was processed by Dr. Thomas B. Welch, a dentist, with the help of his wife and their 17-year-old son, Charles. From 18.1 kg (40 lb) of ‘Concord’ grapes (*Vitis labrusca* L.), the Welches processed, filtered, and bottled the juice and pasteurized it in hot water to kill the yeasts. Orders for juice, mainly for Communion, increased after this initial effort until most of Welch’s time was devoted to preparing grape juice (Chazanof 1977). From the principles of pasteurization developed by Louis Pasteur, Dr. Welch had established a new industry.

Charles Welch took over the grape juice endeavor in 1872 and before long it was a full-time operation for him. In 1896, he moved his new business to Watkins Glen, New York, closer to a large grape-growing area. In 1897, he built a plant in Westfield, New York, which processed 272.3 MT (300 tons) of grapes in its first year (Anon. 1976) and 2723.4 MT (3000 tons) just 5 years later (Tressler 1971).

Consumption of grape juice in the United States has increased in recent years from around 0.158 liter (one-third pint) per person in 1930 to 0.473 liter (one pint) per person in 1979 (Anon. 1981). Most of the unfermented grape juice consumed in the United States is made from
Concord grapes grown outside of California, chiefly in Washington, New York, Michigan, Ohio, Pennsylvania, and Arkansas.

**GRAPE QUALITY STANDARDS**

Quality of grape juice can be defined by those attributes or characteristics of the juice that make it appealing to the consumer. Although what is appealing to one consumer may not be to another, criteria were developed early in the twentieth century for establishing grades and standards for juice grapes. The first standards became effective in the 1940s. Early criteria for grape quality was based entirely upon characteristics that could be manually or visually determined. Color, for example, was the criterion used by inspectors to classify maturity. Grapes that failed to meet the minimum color requirements were downgraded regardless of how favorable other features were.

By the 1960s, quality standards were antiquated by the transition from hand harvesting to mechanical harvesting, and new systems of evaluation had to be developed. The latest grades and grading procedures for grapes became effective on September 1, 1977. These standards apply to all types of grapes to be processed, whether the fruit is hand or machine harvested. As with standards for all other fruits and vegetables, these standards are enforced on a voluntary basis.

The grade for a specific lot of grapes is determined on the basis of one composite sample made from many subunits. The subunits, selected to represent all the portions of the lot, are combined to form a composite sample.

The grade U.S. No. 1 consists of grapes and juice that are (1) mature (not less than 15.5% soluble solids as determined by an approved refractometer); (2) of similar varietal characteristics (having the same skin and pulp characteristics); and (3) free from damage by visible mold, immature berries, foreign materials, sunburn, freeze injury, attached insects or insect injury, or any other cause. The word *damage* means any defect or combination of defects that materially detract from the processing quality of the grapes.

The grade U.S. No. 2 consists of grapes and juice that meet all the requirements of grade U.S. No. 1 except that berries (1) shall be at least fairly well matured (not less than 14.5% soluble solids) and (2) are allowed a higher tolerance for certain defects and foreign materials. The applicable tolerances for grades U.S. No. 1 and U.S. No. 2 are listed in Table 5.1. In all instances the percentage of defects shall be determined by weight of the sample and the weight of the defective produce.