Arkansas Table Grapes for Local Markets

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To begin a discussion on table grapes in the eastern U.S., one must first define "eastern", along with some description of what a "table grape" is in this region. For purposes of my discussion, I consider the eastern U.S. to include all areas east of the Rocky Mountains (rather than a common delineation of the country using the Mississippi River). The primary reason for this basis is that in general all areas east of the Rocky Mountains, with some exceptions in Texas, Oklahoma, and other states that have relatively dry climates, all have rainfall most or all months of the year, and therefore have diseases, other pests, and fruit-cracking pressures exceeding that of more arid climates such as in the western U.S. states. The definition of a "table grape" is a more difficult task. In the East, even today, seeded, slip-skin grapes such as Concord are sold in some markets as a fresh-eating grape. However, many would argue that Concord is not a table grape, but rather a processing grape used for juice. Therefore, it seems that the definition of a table grape might vary based on a number of considerations. I believe that one might designate the following definitions with the first being a very basic and early U.S. designation and the last a more modern-day, purist definition:

- A grape that is improved in quality (over wild or poor quality fruits) and could be produced for fresh fruit consumption locally,
- A grape with improved fruit size over that of native or small-berry wine types,
- A grape bred specifically for improved eating quality (rather than for processing) but not necessarily seedless, non-slipskin, or crisp,
- A grape developed exclusively for the table market with the characteristics of seedless, crisp, edible skin, and can be consumed easily with no discarding of skins or other inedible components. This definition would be what most modern-day consumers would consider a table grape, while the prior three types would be unfamiliar to most Americans today.

A Brief History of Eastern Table Grapes

The longest continuing table grape breeding program conducted by a public agency was initiated in 1919 by the New York State Agricultural Experiment Station (NYAES). The first breeder was A.B. Stout who was employed by the New York Botanical Garden located in Bronx, N.Y. This unique arrangement allowed evaluation and breeding to be done in Geneva while he worked in New York City the majority of his time. The first eastern U.S. seedless grape released was Stout Seedless which was introduced in 1930. Early introductions had significant limitations in performance including fungal disease susceptibility, tendency for fruit cracking, and winter hardiness limitations. The NYAES program continued with noteworthy releases including the seeded Steuben in 1947 and Alden in 1952. Three additional seedless releases were Interlaken (1947) along with Himrod and Romulus (1952). The NYAES program most recently released Einset Seedless (1985) and Marquis (1996).

The longest sustained grape breeding effort in the Midwest has been carried out by the Univ. of Minnesota. The program was begun in 1908, and the notable early release was 'Bluebell' in 1944. Although the modern emphasis has been on wine grape improvement, a small table effort continues with objectives of hardiness, disease resistance, seedlessness, crisp texture, and enhanced flavors including muscat and other flavors. The grape breeding program based at the Horticulture Research Institute, Vineland Ontario, (now Univ. of Guelph) has largely focused on wine grape breeding, but the release of Vanessa Seedless in 1985 provided an adapted, crisp/non-slip-skin genotype. Other table grape improvement efforts that are no longer active include the Univ. of Illinois, the South Dakota Agricultural Experiment Station and the State Fruit Experiment Station in Missouri (now part of Missouri State Univ.).

The Univ. of Arkansas program was begun in 1964

by J.N. Moore. This ambitious program focused primarily on table grapes, and included objectives such as fruit cracking resistance, improved texture including non-slip-skin, seedlessness, a range of flavors (American species and muscat), shape variation, attractive clusters, disease resistance, and winter hardiness. Releases included Venus (1977), Reliance (1983), Mars (1985), Saturn (1989), Jupiter (1999), and Neptune (1999). Upon Moore's retirement in 1996, I assumed leadership of this effort and the program continues today with the same major objectives.

Major Objectives in Eastern Table Grape Improvement

Texture. As with most fruit breeding efforts, table grape quality is increasingly taking the paramount role in variety improvement. In the U.S., most consumers are unfamiliar with non-crisp, slip-skin table grapes due to the dominance of the market by *V. vinifera* shipped from California. Therefore, a widely accepted genotype will likely have non-slip-skin texture. Two eastern developments that fit in this category are Vanessa Seedless and Jupiter. Although they lack in the crispness of the California varieties, they provide a different mouth sensation compared to slip-skin varieties such as Mars or Einset Seedless. However, in breeding for firmer texture, an increase in the *V. vinifera* component is required, and this leads to many of the shortcomings mentioned earlier. An additional benefit of crisp texture is that seed traces are usually not as noticeable in crisp berries. However, the most discerning consumer will have concerns if grapes are not fully seedless if they are marketed as such.

Seedlessness. Complete seedlessness is desired in all table grape improvement programs. With the advent of seedless x seedless crossing, the development of fully seedless genotypes has been enhanced. However, currently the active eastern U.S. programs use seeded x seedless crosses, with a significant number of the resulting progeny being seeded along with variation in seed trace size. Complete seedlessness is found in most retail market table grapes, and eastern table grapes would be more desirable if absence of seeds was assured in market offerings.

Fruit cracking resistance. One of the greatest challenges in developing table grape varieties for climates where summer rains occur during ripening or harvest is resistance to the cracking or splitting of the skins. Substantial success has been made in this area over the years, and resistance to cracking is much more advanced than in the first eastern varieties. In general, the trend of increased quality with traits such as crisp texture, thin skins, and complete seedlessness results in a greater tendency to crack. Reliance is an example of a genotype with exceptional flavor and sweetness, but in many locations (including Arkansas where it was developed) it can exhibit extreme cracking if near mature when summer rainfall occurs

Flavors. I believe one of the most exciting areas of table grape improvement is the enhancement of flavors, with these coming from muscat and American species, particularly *V. labrusca* and hybrids of this species. Most commercial table grapes in retail markets have two main sensations upon eating: a crunch, crisp texture, and a taste of sweetness (assuming the grapes were mature when harvested). Those familiar with a wider array of flavors know that consumers are missing out on a much wider flavor profile than exists in current commercial table grapes. In the Arkansas and New York programs, along with others in the eastern U.S., a range of flavors has been incorporated in table grape selections and varieties, and these offer a much more exciting eating experience.

Winter hardiness. A primary objective since the beginning of eastern table grape breeding, some degree of winter hardiness greater than that found in *V. vinifera* is required for reliable production in the East. The more advanced achievements in hardiness in eastern varieties have been in the Univ. of Minnesota program and the private program of Elmer Swenson. Excellent hardiness has also been achieved in many NYSAES varieties. The hardiest of the Arkansas varieties is Reliance, which was found to be hardy in Wisconsin in its early evaluation prior to release.

Disease resistance. All programs have some degree of screening for common diseases such as black rot, powdery and downy mildew, anthracnose, and other fungal concerns. Field screening of seedlings and selections is the primary method of identifying disease resistance. The NYSAES program is a leader in current disease resistance breeding, and probably has the most intense screening for resistance in its routine breeding procedures. In the Arkansas program, fungicides are applied to some degree in the seedling and selection vineyards, due to the extreme disease pressure in this environment of high temperatures and humidity plus rainfall. It is not likely that varieties with exceptionally high quality will be developed that do not require some fungicide applications for reliable production.

Arkansas Varieties for the Mid-Atlantic

Jupiter. This is the hottest of the Arkansas varieties currently, and is increasing in planting and consumer popularity. It is highly recommended for trial or planting in the Mid-Atlantic based on reports from area states, particularly New York. It appears to have adequate hardiness for much of the northeast. Its main attribute is flavor, with a muscat flavor blended with some American flavors. It is also non-slipskin and is accepted by consumers almost universally. It is dark red to purple when ripe. It is generally crack resistant, has medium clusters of medium fill, and moderate yields. It needs a good downy mildew control program.

Mars. This 1985 release still merits consideration. Its hardiness and reliable cropping are major considerations for the Mid-Atlantic. It is blue/purple, seedless, slipskin, and has an American grape flavor somewhat like Concord but not as strong. It is very vigorous, usually high yielding, and has medium clusters that are usually well filled to tight. It is the most disease resistant of the Arkansas varieties, but still must be sprayed with fungicides for reliable cropping.

Neptune. The only green (white) grape from the Arkansas program, this fruity-flavored, non-slipskin grape might be considered for trial in the Mid-Atlantic. The main concern is winter hardiness, as it has not fared well in New York winters in some reports. It has large, beautiful clusters, non-cracking berries, but only moderate yields. Like Jupiter, it needs careful downy mildew control.

Reliance. This 1983 release is still a favorite of many. It has a wonderful fruity flavor, is slipskin, and has medium clusters. It is very winter hardy, and should survive harsh winters in the Mid-Atlantic. Its main limitation is fruit cracking, in that it will crack badly in summer thundershowers near maturity. However, Midwest growers tend to have better luck with Reliance than one might in Arkansas with the cracking issue.

Other varieties to consider for the Mid-Atlantic from other programs include Einset Seedless, Marquis, Vanessa Seedless, Interlaken, and others from the NYAES program. Local or regional testing should be investigated to determine the best adapted varieties for your area.