


'STEUBEN' GRAPE: PRODUCTION CHARACTERISTICS, QUALITY, AND MARKET POTENTIAL

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ABSTRACT: The 'Steuben' grape is a hybrid cultivar resulting from the cross between 'Wayne' and 'Sheridan', notable for its versatility and resilience. Originating in the United States, this variety demonstrates good adaptability to diverse climatic conditions and is cultivated for both fresh consumption and processing. Its sweet flavor, bluish-purple coloration, and disease resistance make it an attractive option for both growers and consumers. With a phenological cycle typical of *Vitis labrusca* cultivars, 'Steuben' exhibits moderate yield potential, producing medium to large clusters with firm berries—attributes that favor its commercial

appeal. In addition, its fruits exhibit high sugar content and balanced acidity, which contribute to its sensory quality and make the variety suitable for juice and table wine production. The market potential of the 'Steuben' grape is promising, particularly in light of the growing demand for natural and sustainable products. Its resistance to diseases reduces the need for chemical inputs, supporting more ecologically sound viticultural practices. Moreover, its antioxidant properties and distinctive flavor expand marketing opportunities for both fresh consumption and industrial processing. The development of Brazilian viticulture could benefit from the introduction of new cultivars such as 'Steuben', increasing productive diversity and adding value to the sector. Its cultivation represents a viable alternative for growers seeking high-quality, resilient fruit with strong market acceptance. The rising interest in healthy and functional foods further reinforces its potential across multiple consumer niches, thereby enhancing the competitiveness of national grape production.

INTRODUCTION

Viticulture is one of the most important agricultural activities worldwide, with significant socioeconomic and cultural impacts. Countries such as Italy, France, Spain, the United States, and China rank among the world's leading grape producers, renowned for the excellence of their wine production, table grapes, and other grape-derived products (Ibge, 2024). In Brazil, viticulture has assumed an increasingly relevant role, generating income and employment—both directly and indirectly—in rural areas, particularly in the South, Southeast, and Northeast regions. In 2023, Brazil produced 1,719,630 tons of grapes across 76,747 hectares, with Rio Grande do Sul leading production with 51%, followed by Pernambuco (23%), São Paulo (11%), and Bahia (5%). The state of São Paulo alone produced 189,160 tons of grapes in 2023, ranking third nationally (Ibge, 2024).

Regarding production allocation, 51.4% of grapes are destined for processing and 48.6% for fresh consumption. In 2022, processed grape production (including wines, juices, and derivatives) reached 830.92 million kilograms, representing 57.07% of the national output (Agrianual, 2022). Rio Grande do Sul is responsible for 90% of Brazil's wine, juice, and grape derivative production, and the country produced 665 million liters of wine in 2023 (Ibge, 2024).

Brazil's diverse edaphoclimatic conditions enable the successful cultivation of a wide range of grape cultivars suitable for both fresh consumption and processing. In this context, the evaluation and introduction of new cultivars are strategic to meeting the evolving demands of the market, while also harnessing the productive potential of different environments and providing growers with new income opportunities. The selection of cultivars adapted to local conditions can enhance production efficiency and fruit quality, diversify cropping systems, and contribute to the sustainability and competitiveness of Brazilian viticulture. Therefore, assessing the performance of new cultivars, such as 'Steuben', is essential to expand the range of viable grape production options in Brazil, promoting innovation and growth in the sector.

The 'Steuben' grape is an interspecific hybrid resulting from the cross between 'Wayne' (Mills × Ontario) and 'Sheridan' (Herbert × Worden), containing genetic material from *Vitis labrusca* and *Vitis vinifera*. The hybrid was developed in the United States in 1925 by breeders Richard Wellington and G.D. Oberle. The cultivar was named in honor of the German-American General Friedrich Wilhelm Von Steuben (1730–1794), a prominent military figure in the United States who served as a Prussian officer under King Frederick the Great (1712–1786). The 'Steuben' grape also served as a parent in the development of the hybrid cultivars 'Corot Noir' and 'Noiret' (Slate et al., 1962; Julius Kühn-Institute, 2025; Wine Grapes, 2025).

The origin of ‘Steuben’ dates back to the early 20th century, when researchers sought cultivars that combined desirable sensory attributes with resistance to pests and diseases. Over the years, this cultivar has been primarily cultivated in the United States and in select regions of South America, where it has found favorable edaphoclimatic conditions for commercial production. In Brazil, where viticulture is still largely dominated by the ‘Isabel’ cultivar, ‘Steuben’ is not yet widely cultivated, but it shows significant potential—especially in niche markets that value fruit quality and sensory attributes.

‘Steuben’ is characterized by its bluish-purple coloration, sweet flavor with a subtle muscat note, and high resistance to fungal diseases. It presents favorable cultivation potential in multiple regions due to its climatic adaptability and versatility, being suitable for both fresh consumption and the production of juices and table wines (Wine Grapes, 2025).

The cultivation of this variety requires attention to certain agronomic factors, including the choice of an appropriate training system, pruning length, and nutrient management. Although it is a rustic and adaptable cultivar, its productivity and final quality may be influenced by variables such as temperature, water availability, and crop load. In addition, its natural disease resistance reduces the need for frequent pesticide applications, making it an attractive option for sustainable viticulture.

Given this context, the objective of this chapter is to provide a comprehensive analysis of the ‘Steuben’ grape, addressing its production characteristics, physicochemical quality, and market potential.

PRODUCTION CHARACTERISTICS

The phenological development of the ‘Steuben’ grape follows patterns typical of *Vitis labrusca* hybrid cultivars, with a vegetative and reproductive cycle that is adaptable to various climatic conditions. The vegetative phase begins in spring, with budburst and shoot elongation, followed by leaf development. Flowering occurs between October and November in the Southern Hemisphere, and fruit ripening typically takes place between January and March, depending on the prevailing environmental conditions (Vicentino, 2024). This cultivar exhibits moderate thermal requirements, preferring temperate to subtropical climates, with optimal average temperatures ranging from 18 to 22°C during the ripening phase. Temperature directly influences plant development and sugar accumulation in the berries, which in turn affects both fruit flavor and juice yield.

The ‘Steuben’ grape is considered moderately productive, with yields ranging from 15 to 25 tons per hectare under favorable cultivation conditions. Yield per plant may vary according to vineyard management practices, training system, and desired crop load, but typically ranges from 5 to 15 kg per plant when well managed (Sierra et al., 2024). Climatic factors exert a substantial influence on the productivity of this cultivar.

The clusters of ‘Steuben’ are medium to large in size, generally conical or cylindrical in shape, and exhibit good compactness—an attribute that facilitates handling and enhances marketability. Cluster weight typically ranges from 200 to 400 g (Sierra et al., 2024), with some exceptions reaching up to 600 g, depending on cultivation practices and environmental conditions. The berries are medium-sized, with diameters ranging from 1.5 to 2.0 cm, and display a coloration that varies from bluish-purple to deep violet, depending on the stage of ripeness. Berry weight ranges from 3 to 8 g (Sierra et al., 2024), and the skin is firm, which contributes to improved postharvest handling, transport resistance, and extended shelf life.

QUALITY

The physicochemical quality of the ‘Steuben’ grape is one of the key factors influencing its acceptance for both fresh consumption and the production of juices and table wines. Regarding must composition, ‘Steuben’ grapes typically present soluble solids levels ranging from 16 to 20 °Brix, indicating a high sugar concentration—an important attribute for both the fresh fruit market and processing industries.

The cultivar exhibits moderate titratable acidity, with pH values between 3.4 and 3.8, providing a desirable balance between sweetness and acidity, which enhances its sensory appeal. The sugar-to-acid ratio is a crucial indicator of fruit quality, and the balance between these parameters is particularly suitable for the production of well-structured juices and wines.

In addition, the phenolic composition of ‘Steuben’ includes anthocyanins, flavonoids, and other polyphenols, with concentrations ranging from approximately 150 to 200 mg of anthocyanins per 100 grams of skin, and 120 to 180 mg of flavonoids per 100 grams of skin. These compounds play an essential role in fruit color and flavor and also exhibit significant antioxidant properties.

Antioxidant activity, measured by DPPH and FRAP assays, ranges from 25 to 35 $\mu\text{mol Trolox } 100 \text{ g}^{-1}$ of skin, depending on the fruit’s maturity stage. The phenolic compounds and antioxidant capacity confer potential health benefits, particularly in grape juices, where antioxidant potential is a valued attribute among consumers. These characteristics distinguish ‘Steuben’ from other widely used juice cultivars such as ‘Isabel’ (Rizzon et al., 2000; Ferri et al., 2015), adding value to its commercial appeal.

MARKET POTENTIAL AND USES

The ‘Steuben’ grape exhibits strong market potential for both fresh consumption and the production of juices and table wines. Its attractive physical traits—such as intense coloration and firm berry texture—make it particularly valued in the fresh fruit market. Its resistance to major fungal diseases, including powdery mildew and downy mildew, contributes to more sustainable cultivation practices, reducing reliance on phytosanitary

treatments. This feature is especially appealing to consumers who seek more natural and minimally processed products. Additionally, the fruit's excellent postharvest shelf life, due to its firm skin, facilitates transportation and distribution to more distant markets, making it a viable option for larger-scale commercialization.

In the processing sector, 'Steuben' is an excellent choice for juice production, owing to its well-balanced sugar and acidity content, which results in a pleasant flavor and desirable structure in the final product. The presence of anthocyanins and flavonoids contributes not only to the vibrant color of the juice but also to its antioxidant capacity—an added value for health-conscious consumers. Studies have shown that grape juices with high phenolic content possess significant market potential in the functional beverage segment, offering health benefits such as anti-inflammatory and antioxidant effects (Domingues Neto et al., 2024).

Furthermore, the versatility of 'Steuben' extends to the wine industry, although it is more commonly associated with fresh consumption and juice production. This cultivar can be employed in the production of quality table wines, with pleasant organoleptic characteristics derived from its balanced sugar and acidity profile. 'Steuben' grapes are used to produce wines with subtle "foxy" notes, and are vinified as rosé or *blanc de noirs* (white wines produced from red grapes). Sensory evaluation of wines made from this cultivar typically reveals fruity notes, good acidity, and a smooth finish—attributes that appeal to consumers who prefer light, easy-drinking wines. Nonetheless, the fine wine market remains centered around traditional cultivars, limiting the presence of 'Steuben' in this segment. However, there is growing interest in alternative wines that combine affordability with quality, creating niche opportunities for this cultivar.

Due to its broad adaptability and the increasing consumer demand for natural and health-promoting foods, 'Steuben' has emerged as a promising cultivar capable of meeting the needs of a market that values both practicality and nutritional benefits.

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