



## Optimizing Grape Export Quality through Strategic Girdling Techniques

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In grape cultivation aimed at export-quality production, girdling plays a crucial role. After fruit pruning in vineyards, grape clusters typically emerge following the development of five leaves. These clusters begin to develop further after berry setting. Grape production is generally carried out with two distinct objectives: for export markets and for local/domestic markets. Compared to other fruit crops, grape cultivation requires significantly higher investment. Therefore, growers consistently strive to achieve superior quality yields, beginning from the early berry development stage typically when berries are about 2–3 mm in size. To produce high-quality grapes, it is essential to integrate several cultural and management practices, including cluster and berry thinning, application of biostimulants, and the practice of girdling. Girdling, in particular, is an important technique that helps enhance berry size, improve sugar accumulation, and ensure uniform ripening all critical parameters for meeting export standards. This article provides a concise overview of the girdling technique and its importance in achieving export-quality grape production.

### Benefits of Girdling in Grapevines

Girdling is a horticultural practice where a narrow strip of bark is removed from the vine shoot or trunk. This interrupts the downward translocation of photosynthate through the phloem, causing the assimilates (nutrients and sugars) to accumulate above the girdled area, particularly in the developing clusters. This practice leads to several physiological and developmental benefits in grape production:

**Improved Color Uniformity in Colored Cultivars:** Girdling promotes uniform anthocyanin accumulation, resulting in better and more consistent coloration of grape berries in red and black grape varieties.

**Enhanced Sugar Content (Brix Level):** Accumulation of photosynthate in the berry clusters leads to an increase in sugar concentration, improving sweetness and overall fruit quality.

**Early Maturation of Clusters:** Girdling accelerates the ripening process by promoting faster sugar accumulation and reducing the time to harvest.

**Improved Berry Size and Swelling:** Enhanced nutrient allocation increases cell expansion in berries, leading to better berry enlargement and firmness.

**Stronger Berry-Peduncle Attachment:** Girdling improves the strength of the berry's attachment to the rachis, reducing premature berry drop (shatter).

**Reduced Berry Drop (Shattering):** The stronger pedicel connection reduces post-veraison berry drop, improving marketable yield.

**Improved Fruit Set:** The higher availability of assimilates during flowering and fruit set increases the rate of successful fruit development.

**Increased Overall Yield:** By enhancing berry set, size, sugar content, and reducing losses due to shattering, the total yield per vine is significantly improved.

## Methods and Appropriate Timing for Girdling

Although horticulturists are aware of the advantages of girdling, questions remain regarding the precise method and the exact developmental stage at which girdling should be performed. Currently, girdling has shown positive effects on export-quality Thompson Seedless, Sharad Seedless, Sarita Seedless, Nanasaheb Purple, Jumbo Seedless and Tas-A-Ganesh grape varieties. However, the response to girdling varies among different grape cultivars. Among these factors, the timing of girdling in relation to shoot growth stage and grape variety plays a crucial role in increasing shoot thickness. However, since shoot size increases daily, each day is critical for the procedure. Research conducted at the National Grape Research Center indicates that girdling Thompson Seedless grapevines at the shoot stage when the berry 4 to 6 mm in size results in significant improvement in shoot thickness and overall benefit. Conversely, for Sharad Seedless grapevines, girdling is more effective when performed at a berry size of 6 to 8 mm, leading to increased berry size and better growth.

Horticulturists usually determine the timing for girdling grapevines by counting the days following pruning. However, the time needed for the vines to reach the suitable stage for girdling after pruning can vary due to environmental factors. Hence, performing girdling based on the actual observation of the bud development stage results in more effective outcomes. This is because active cell division takes place during the bud growth phase, making girdling at this stage particularly impactful.

## Preventive Measures to Be Taken During the Girdling Procedure

- While girdling often results in enhanced bunch size and berry weight, these improvements cannot be attributed to girdling alone. Additional viticultural practices such as managing bunch load per vine and performing berry thinning at the appropriate growth stage are equally important for ensuring optimal fruit development.
- It is crucial to maintain sufficient water supply to girdled vines until the wound has completely healed and throughout the subsequent recovery phase.
- Following girdling, it is critical to prevent any nutrient deficiencies or physiological stress in the vine until complete wound healing occurs. Continuous provision of essential nutrients and growth regulators is necessary to facilitate recovery.
- When performing girdling, attention should be given to removing bark that is evenly circular in shape.

## Aftercare Procedures Following the Girdling Practices

- Girdling results in the formation of a wound on the stem, which may act as a potential entry point for various pathogens and insect pests. To mitigate this risk, it is common practice among cultivators to apply a combination of insecticides and fungicides directly to the affected area. However, over-application can lead to systemic uptake and prolonged persistence of chemical residues within the plant tissue. Hence, for effective protection against secondary infections and pest attacks, it is advisable to treat the girdled area with a mixture of blue copper (a copper-based fungicide) and an appropriate insecticide.
- Failure to promptly apply insecticidal paste to the girdling wound can lead to mealybug infestation at the site, with potential spread to developing fruit clusters over time. To inhibit mealybug development and ensure effective pest management, it is crucial to treat the wounded area with a suitable insecticide, thereby reducing the risk of further infestation.