



A Review of Vine Girdling

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Grapes are girdled at berry set to increase berry size or at veraison (berry softening or color break) to advance sugar and color development. Sometimes vines are double girdled to achieve both responses. The immediate effect of a complete girdle is to interrupt the movement through the phloem of food materials produced by the leaves. This increases foliar carbohydrates (sugars and starches) and plant hormones in vine parts above the girdle at the expense of the trunk and the root system (6,7)

Thompson Seedless Girdling Responses

Thompson Seedless table grapes are girdled at fruit set to increase berry weight, to improve berry uniformity, and to reduce post harvest shatter. The increase in berry weight will average 10 to 30% depending on crop load and the amount of gibberellin applied.

The girdling operation can begin at the completion of shatter when berry diameter averages 3 mm and should be completed before berries reach 6 to 8 mm in diameter, about a week after shatter. Girdling before the completion of shatter or during bloom results in a heavier set and subsequently tighter clusters. Girdling late is not as effective for enlarging berries.

Girdling at veraison (when berries begin to soften) hastens maturity but does not increase berry size. It is only used when pursuing an early market. With Thompson Seedless, this requires girdling the

vine twice (berry set + berry softening) which is tough on the vine. A maturity girdle can advance harvest a week but the response diminishes when vines are heavily cropped. Crop load should be adjusted to take full advantage of the maturity girdle.

The easiest way to double girdle is to reopen the fruit set girdle rather than girdle at a new location on the trunk. Only vigorous vineyards should be double girdled, and a vineyard shouldn't be double girdled every year unless it is exceptionally strong. Girdling canes at berry softening rather than reopening the trunk girdle may be less debilitating to the vine since leaves and shoots below the cane girdle continue to nourish the root system.

Flame Seedless Girdling Response

Girdling Flame Seedless at berry set increases berry size about 10 to 15% over gibberellin treatment alone. Girdling at berry set is necessary in most vineyards to achieve large berries (berry diameter 14-15/16"). However, color development is also retarded, sometimes only a little, sometimes a lot.

Color development is also reduced as rates of gibberellin applied for berry sizing exceed 48 grams per acre. Research has shown that when considering both berry weight and color development, best results are obtained with an application of about 48 grams per acre either as a

single application or as 2 applications of 24 grams. Higher rates of gibberellin result in slightly greater berry size, but at the expense of color development (1).

The combination of a berry set girdle, high rates of gibberellin, and a heavy crop can result in much of the crop not coloring enough to meet grade. Color development is very sensitive to excessive crop; sugar accumulation and berry size are also reduced as overcropping becomes more severe.

The application of **ethephon** at color break should be considered in vineyards where color maturity has been a problem. Research has shown that ethephon significantly improves the color development of fruit subject to high rates of gibberellin. However, color development is still delayed and reduced with high rates of gibberellin, even with the use of ethephon, but to a lesser degree (1). Ethephon increases color development but not soluble solids (5).

Girdling at the beginning of ripening, just as color begins to develop, enhances both color and sugar development, drops titratable acid, but does not increase berry size. An increase of about 1 °Brix is achieved with the maturity girdle. Little or no response will occur when vines are heavily cropped. Crop load must be properly adjusted to take advantage of a maturity girdle.

Like Thompson Seedless table grapes, a maturity girdle requires double girdling in most cases (berry set + color break). Double girdling is tough on the vines. Only vigorous vines should be double girdled, and care must be taken to avoid girdling excessively deep.

Making the Girdle

Girdling removes a ring of bark entirely around the trunk or cane. To be effective, the girdle

must cut through the phloem and cambium tissue without injuring the wood or xylem.

The phloem is a layer of tissue about 1 to 2 mm thick. The cambium is a thin layer of cells between the phloem and xylem tissue that rapidly divide and differentiate into new layers of phloem or xylem (wood). The strip of phloem is easy to remove when girdling because it slips off at the cambium layer. The tissue that makes up the bulk of the trunk or cane is xylem or wood tissue which is white and fibrous. Girdling should remove all of the phloem and cambium layer without digging or gouging into the white fibrous, wood tissue (7).

It takes about four weeks for the girdle to heal. During this period roots are poorly nourished reducing root growth, and vines are more susceptible to heat and water stress. Irrigations must be carefully scheduled to avoid further stress.

Girdle Must Be Complete

It is important that the girdle completely ring the trunk or cane in order to get a full response. Missing as little as 5% can result in an ineffective girdle (3). This underscores the importance of checking to make certain girdles are complete. Girdles should be examined for completeness after about 20 minutes. Phloem tissue missed turns dark, is easily observed, and should be cleaned out to complete the girdle.

It is also important not to girdle too deep into the wood or water conducting tissue. Deep girdles heal slowly and vines can be weakened and even killed. When white, fibrous wood chips are prevalent among the girdling debris on the ground, then the girdle is too deep.

Girdler Knives

Trunk girdlers are double bladed knives having either 1/8, 3/16, and 1/4 inch width between blades. A study comparing these knife widths showed no difference in fruit response or healing

time (2). The healing process becomes obvious in about two weeks with callus tissue developing mostly from the top of the girdle. The callus tissue bridges and phloem transport is reestablished in about a month. The 3/16" and 1/4" girdles are easier to check for completeness and are the most commonly used. The small, 1/8" girdler is primarily used for reponing girdles when double girdling.

A **single bladed knife** has also been used to girdle vines. Knife-line girdles are intermediate in their response between no girdle and a standard double bladed knife (4). A knife-line girdle heals in half the time and is sometimes used on young vines (that must be trunk girdled) to reduce the risk of damage.

Cane Girdling

The cane girdler (spring loaded plier-type) has 3/16 inch width between blades. Cane girdling is normally used on very young vines to reduce the risk of vine injury, or on very old vines that are difficult to girdle. Girdling the cane is just as effective as girdling the trunk (2), except that fruit below the cane girdle is not benefited.

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