Literature Review it discusses the importance of pruning in agriculture grape garden

Fatima Kadum Jouda [1*], Noora Hade Najm Alabojaml [2]
[1-2] Department of Field Crops, College of Agriculture, Al-Qasim Green University, Iraq

* Corresponding Author: **Fatima Kadum Jouda**

Article Info

E-ISSN: 3107-7145
Impact Factor (RSIF): 8.03
Volume: 02
Issue: 01
Received: 05-01-2026
Accepted: 26-02-2026
Published: 28-03-2026
Page No: 47-51

Abstract
Pruning is one of the most important cultural practices in grape (*Vitis vinifera* L.) production. It plays a vital role in vine shaping, regulating yield, improving fruit quality, and maintaining long-term vineyard productivity. This literature review highlights the significance of both winter and summer (green) pruning in grape cultivation, particularly in balancing vegetative growth and fruit production.
Proper pruning enhances canopy light penetration and ventilation, facilitates harvesting, reduces fungal diseases such as gray mold (*Botrytis*), and improves berry size, color, soluble solids, and phenolic compounds. Summer pruning and leaf removal effectively control excessive vigor, promote better fruit set and ripening, though over-pruning may reduce yield in some varieties.
Recent studies show that late winter pruning can delay technological ripening (sugar accumulation) while preserving or enhancing anthocyanin and phenolic content. This strategy is especially valuable under warming climates to maintain desirable anthocyanin-to-sugar ratios and improve wine quality.
Overall, well-timed pruning is an essential, sustainable tool that optimizes productivity, fruit quality, and vine health while reducing reliance on chemical inputs.

DOI: https://doi.org/10.54660/IJANFR.2026.2.1.47-51

Keywords: Grapevine, pruning, Vitis vinifera, berry quality, yield regulation, climate adaptation

Introduction

Grapes are classified as (Vitis vinifera is a European grape species belonging to the Vitaceae family, which comprises about 14 genera, the most important of which is Vitis. It is estimated that there are 700 species of grape; 10,000 varieties are widely grown throughout the world (Alleweldt *et al*., 1999) [8]. Grapes are the important horticultural crop in Iraq and mostly cultivated crop in the world in terms of nutritional value and economic returns. Grapes are one of the most plentiful summer fruits, surpassed only by citrus fruits, and a popular fruit among many consumers. (Qasim *et al*., 2012) [7]. The bulk of the botanists believe in the Mediterranean region, where the European grapesVitis vinifera L. are thought to have originated, as the parent region of all the varieties of Vitis before North America was discovered, from which the cultivation of grapes spread east and west (Hassan and Salman, 1989) [2]. According to Hidago (1980) [11], the region between the latitudes 34° and 45° North, and 31° and 38° South is the birthplace of grapes. Grapes, however, are said to have been originated from the Mediterranean basin; the Sumerians had vines there at the end of fifth millennium BC. In addition, fossilized grapes were discovered prior to human history in Germany and Iceland (Al-Rawi and Al-Rawi, 2000) [3]. Grapes are one of the most important fruit crops in terms of the fruit yield and the land area under cultivation, representing one-third of the global production of fruit trees (Al-Saidi, 2000) [5]. The total area planted with grapes in the world was about 7586600 km2, and its production was 68901744 tons. The majority (71%) of the world's grape production is used for wine, a small proportion for dried grapes, some for natural juice and the rest for fresh consumption (FAO 2012) [9].

There are no reliable figures on the area planted with grapes in Iraq or the total grape production. The older estimate from the Arab Organization for Agricultural Development in 2014, however, shows that the crop area in Iraq is 10,788 hectares, and its production is 270,000 tons.

Grapes are unique in their many medicinal and therapeutic properties, because they are a complete food containing sugars, acids, proteins and dietary fibers. They are also a food substance that stimulates brain cells, heart muscles and strengthens the liver and kidneys.

As Jamal al-Din (2010) [1] pointed out. Depending on the variety, environmental conditions and other factors, pruningIt is one of the most important aspects of grape production, which helps maintain the strength and density of the crop and prolong its fruit production cycle (For Al-Sarwani,(2008) [4]. Pruning can be used to direct plant growth to meet the requirements of the environment. As mentioned, the training method used during the first years of a seedling's development could be critical in determining the plant's shape and growth throughout its life. (Surial and others,1988) [6].

Pruning

Grapes are pruned in the summer season (green pruning) to control growth and fruit production. This results in greater fruit set, higher yield and better quality attributes of berries, such as color. This pruning also makes agriculture easier and better for disease resistance as it involves sacrificing a portion of the vines' foliage without compromising production, creating a natural balance between fruit production and foliage. Chemical fertilizers have long been proven to be useful for boosting production and quality of crops, but in recent years have been identified as having detrimental impacts on human health. Thus nowadays the tendency is to decrease the amount of chemical fertilizers and supplement them with organic compounds which are not fertilizers but work synergistically without adversely affecting the environment or human health. These compounds also make the plant more tolerant of adverse environmental factors. Shehata *et al*., 2011) [21].

Pruning is viewed as one of the vital grapevine production practices, because of its importance in shaping the vine. It also dictates fruit yield and fruit quality and plays a role in maintaining vines' vigor for future years. It has been pointed out that… (Strik 2002) [22] states that good pruning can serve a number of useful purposes such as:

1. Giving the tree a good shape**.**
   for- To get a balance between vegetative growth and fruit production**.**
2. Making harvesting easier and helping to reduce the exposure to fungal diseases like gray mold (Botrytis)
3. Providing good lighting and ventilation for all areas of the tree, which is important when trying to produce good quality fruit and differentiate and form fruit bearing buds for next seasons crop**.**

Summer (green) pruning is crucial as it will allow light to reach the interior of the tree and promote the growth of shoots before temperatures fall, which is important in autumn. (Koukouryannis, 1990) [12]. Also reaffirms the need to not over prune in summer to avoid sunburn on bushes and fruits (Strik, 2002) [22].

Review of sources

Most studies that measured the impact of late pruning were found to have a significant delay in grape ripening (either based on the number of days it takes to reach the same ripeness as the control vines at harvest or as a reduction in physiological ripening if there was one harvest date). A general trend in this accelerated ripening was that the technological ripening (S/A ratio) was nearly always coupled with a slower rate of sugar gain to increased acid retention and an increased phenolic ripening caused by delayed winter pruning. So, Merlot grapes that had 3 unfolded leaves were cut in late winter and clusters contained titrable acidity. They achieved higher anthocyanin: sugar ratios at harvest than in conventional pruning (AllegroAnd others, 2020) [23]. Similarly, the ratio of anthocyanin to total soluble solids (TSS) was found to be greater at >13.5 Baumé (Petrie) sugar concentrations for fruit of the Shiraz and Cabernet Sauvignon trees at EL 2 to EL 15. And others, (2017) [25]. Late pruning of Sangiovese grapes (Palliotti)And others,2017 [24]and Silvestroni) And others,2018) [26] and pruning of Pino Noir grape (Gatti)And others,2018) [27].

This led to a regular common pattern of significant harvest maturity delay (higher TSS and lower TAC), no difference in TAN and an increase in PC content. Despite the different varieties and conditions, three studies investigating late pruning revealed positive relationships between late sugar accumulation and total phenol and total anthocyanin levels at harvest.At the same time, the number of cases of COVID-19 continues to rise around the world (FrioniAnd others2016; Moran,And others2017; ZhengAnd others,2017) [28, 25, 30].

The results show that anthocyanins were detached and there was an increase in sugars and a decrease in the rate of sugar accumulation both of which are a big concern in a global warming scenario, particularly in warm/hot climate zones, while the concentration of phenolic compounds is expected to either remain constant or rise. This is achieved through late winter pruning as well as a variety of other pruning methods. SadrasandMoran,2012 [31], PalliottiAnd others,2014 [33], PoniAnd others,2018 [27], Gutiérrez-GamboaOthers - 20202021- [34],However, an explanation must be provided for this potential disconnection from the late winter pruning technique. Research has shown that anthocyanin synthesis is inhibited, and degradation is accelerated, in the former case at 35°C, suggesting that if pruning is delayed, anthocyanin production will be delayed to a cooler period of the day, resulting in better color in the grape. A recent study aimed to assess the impact of winter pruning time and temperature on the anthocyanin/sugar ratio of Shiraz grapes, and discovered that late pruning contributes to maintaining this ratio, which decreased with increased winter temperature over two seasons (Moran *et al*. 2019, 2021) [36, 29]. Importantly, the intensity of the wine and concentrations of anthocyanin and phenol have a negative correlation with the average daily temperature over a short period (10 days) after the wine has been coloured. However, other influences can not be ruled out. The highest skin to pulp ratio at harvest was obtained with late winter pruning in Merlot grapes (Allegro *et al*., 2020) [23]. If the cell cortex formation takes place in the first 4–5 weeks after flowering (Coombe and McCarthy, 2000) [37], this may be enhanced by quicker cell division; the first stage of grape growth could be delayed to a warmer season

to achieve this. The proposed mechanisms have some important benefits to note, but late winter pruning of Shiraz grapes at stage EL 15 and Cabernet Sauvignon grapes at stage EL 11 did significantly lower yield, without maximising anthocyanin/Total Soluble Solids (TSS) concentrations (Petrie *et al*., 2017) [25]. Thus the segregation effect of late winter pruning is lessened if the pruning is done too late.

Pruning is one of the basic farming operations for grapevines, and is used to form the vine. It also affects yield and fruit quality and is an indicator of the quality of the fruit in subsequent years.

He notedStrik((2002) [22] that good pruning has a number of good purposes such as:

1. Developing good structure in the tree*.*
2. Make sure there is an equilibrium between fruit production and growth*.*

Making harvesting easier and minimising exposure to fungal diseases like grey mold (Botrytis).

For high quality fruit, good lighting and ventilation of all parts of tree; differentiation and development of fruit-bearing buds for next year's crop.

Summer (green) pruning is essential as it helps to let in light inside the tree and helps the shoots grow as the fall temperatures drop. (Koukouryannis, 1990) [12].

It is recommended not to cut more during summer to prevent sunburn of the bushes and fruits, as he confirms Strik(2002) [22].

Literature Review

Many studies on summer pruning have focused on its effect on determining leaf area, just as it affects fruit quality and color.

A Regional Agricultural Center (RAC), Sabha, Libya was used to study three varieties of grapes (Cardinal, Alphonse Lavalle and Sultana). Cutting of these varieties were done weekly. The results showed that cluster yield and also the average cluster weight per vine were significant for varieties and treatments. The berry size, number of berries per cluster, cluster length, shoot length and number of leaves were also found to vary between varieties. El-HodairiAnd others,1995) [13].

The effect of summer pruning on yield and fruit characteristics of one of the varieties of grape was studied. In 1983 bushes were pruned with 2-3 nodes above the flowering and berry-setting area, which Perlette considers to be the optimum level. In the first instance the buds that had just issued after pruning sprouted a little more slowly and in the second instance, the lateral (summer) shoots grew normally. The results also indicated that there was an improvement in the productivity of the trees and the berry size. The cluster weight did increase significantly and there was no significant difference in either soluble solids or acidity depending on the pruning method used. MANN, AND SINGH, 1985) [14].

Summer pruning is responsible for the decreased bush size, enhanced fruit set and fruit ripening. The growth vigor of the shoots, and water absorbed (directly proportional to light exposure of leaves depending on the frequency of pruning during the Summer), correlate with pruning vigor. High levels of growth stimulate fruit set and productivity, but high levels of growth will cause a reduction in fruit set and delay ripening. CARBONNEAU, 2007) [15].

A study was carried out of vineyards.The manual and mechanical leafing were conducted on Sangiovese in Italy, and removed the 6 major leaves from the bunches at 2 different stages: when the flower clusters appeared and at the fruit set stage. The results indicated that the fruit set percentage, bunch yield, cluster weight and cluster compaction decreased significantly while total soluble solids, anthocyanins and phenols increased significantly for both the leafing dates. So, in high-yielding varieties, such as Sangiovese, manual and mechanical leafing can cause yield loss and quality improvement. However, the researchers noted that the sun could affect the colour of the berries, which might decrease in colour after being exposed to sunlight (Intrieri *et al*., 2008) [16].

In the Agadir region (Morocco), the different bud densities (14, 20, 30 and 40 buds/bush) were evaluated by shoot pinching at the beginning and the end of flowering on Cardinal grape bushes. The results showed that bud fertility and vegetative growth decreased with an increase in the number of buds per bush and that there was a decrease in bud opening and lateral shoot growth with increased number of buds per bush. The capacity of opening was reduced from 76.7% to 53.7% with the increase in number of buds left from 14 to 40 and the productivity was increased by the 63.8% due to the number of clusters per bush. Stimulation of leaf area development was achieved by pinching, by stimulating lateral (summer) buds. The effect was more pronounced with low bud load and early pinching (20 buds) leading to higher bush yield in the latter case. The yield increased by 31.3% and sugar content reduced by 6.6% with the pinching at the end of flowering. Benismail And others,2007) [17].

Disease can more easily infect large leaf surface, dense growth shrubs that result in less air movement, light intake and fruit quality. Pruning will also remove new growth and tender leaves, the largest consumers of carbohydrates, by removing the top portion of the leaf. Mixed with the lack of leaf area, shrubs can make up for this by producing more summer lateral shoots. Candol Fi - vasconcelosandKoblet,1990) [18].

Removing leaves (defoliation) helps to improve fruit exposure to light and better balance of bush and fruit growth. Mechanical or manual harvest of leaves at the bottom of the leaf cover (30). Too much pruning in the cluster area could result in delayed maturity and less sugar buildup. KliewerandBledsoe,1987) [19].

The productivity and quality of the main shoot of grapes were compared when shoot tip removal (pruning) and shoot removal (pruning) was performed leaving (5) nodes after the last cluster. The quality and quantity of the crop was reduced by pruning, leaving one node after the last cluster. In this treatment the rate of growth was higher, however, than in the other treatments. Pruning resulted in the highest yields and quality of fruit at the end of the growing season overall when pruned to leave 5 nodes after the last cluster. When exceptionally hot and infested, it may be beneficial to leave 3 nodes after the last cluster and to prune in summer. DardenizAnd others,(2008) [20]. Late defoliation of main leaves and/or axillary parcels (second order parcels) results in better ventilation.

References

1. Jamal Al-Din F, Ahmed F. Encyclopedia of medicinal plants. 2nd ed. Alexandria (Egypt): Al-Maaref Establishment; 2010.
2. Abbas HJ, Salman MA. Grape production. Baghdad (Iraq): House of Wisdom, University of Baghdad, Ministry of Higher Education and Scientific Research; 1989.
3. Abdullah AH, Al-Rawi AKS. Fruit production. Mosul (Iraq): University of Mosul, Ministry of Higher Education and Scientific Research; 2000.
4. Al-Sarwani AA. Integrated management of vineyards. Cairo (Egypt): Arab House for Publishing and Distribution; 2008.
5. Al-Saidi IHM. Grape production. Mosul (Iraq): Dar Al-Kutub for Printing and Publishing, University of Mosul; 2000.
6. Jamil S, Abdullah KD, Awad ARA, Azzouz I, Mohsen AM, Al-Mansi AA, *et al*. The science of horticulture. 2nd ed. Arab Publishing House; 1988.
7. Qasim HA, Al-Obaid RS, Ahmed MA. Grape breeding and pruning. Saudi Society for Agricultural Sciences and Fruit Unit; 2012.
8. Alleweldt G, Spiegel-Roy P, Reisch B. Grape (Vitis). In: Moore JN, Ballington JR, editors. Genetic resources of temperate fruit and nut crops. Acta Horticulturae. 1991;290:291–330.
9. Food and Agriculture Organization of the United Nations. Production yearbook. Vol. 60. Rome (Italy): FAO; 2012.
10. Brigelius-Flohé R, Traber MG. Vitamin E: function and metabolism. FASEB J. 1999;13(10):1145–55.
11. Hidalgo L. Viticulture in the semi-arid regions. Bull OIV. 1980;598:845–971.
12. Koukouryannis VC. Kiwifruit cultivation in Greece. Acta Hortic. 1990;282:53–56.
13. El-Hodairi MH, Hamza MA, Al Bashir AH, Ibrahim SB. Effects of pruning time on the yield of grape. Acta Hortic. 1995;409.
14. Mann SS, Singh K. Effect of summer pruning on yield and quality of Perlette grapes. Acta Hortic. 1985;158.
15. Carbonneau A. Theorie of the maturation and the typicité of raisin. Prog Agric Vitic. 2007;123(13):275–84.
16. Intrieri C, Filippetti I, Centinari M, Poni S. Early defoliation (hand vs mechanical) for improved crop control and grape composition in Sangiovese (Vitis vinifera L.). Aust J Grape Wine Res. 2008;14(1):25–32.
17. Benismail MC, Bennaouar M, Elmribti A. Effect of bud load and canopy management on growth and yield components of grape cv. Cardinal under mild climatic conditions of Agadir area of Morocco. Acta Hortic. 2007;754.
18. Candolfi-Vasconcelos MC, Koblet W. Yield, fruit quality, bud fertility and starch reserves of the wood as a function of leaf removal in Vitis vinifera: evidence of compensation and stress recovery. Vitis. 1990;29:199–221.
19. Kliewer WM, Bledsoe AM. Influence of hedging and leaf removal on canopy microclimate, grape composition, and wine quality under California conditions. Acta Hortic. 1987;206:157–68.
20. Dardeniz A, Yildirim I, Gokbayrak Z, Akcal A. Influence of shoot topping on yield and quality of Vitis vinifera L. Afr J Biotechnol. 2008;7(20):3628–31.
21. Shehata SA, Garib AA, Elmogy MM, Abdel-Gawad KF. Effects of humic acids on the growth, yield and chemical parameters of strawberries. J Med Plants Res. 2011;5(11):2304–09.
22. Strik BC. Kiwifruit growing. New Zealand: GP Books; 2002.
23. Allegro G, Pastore C, Valentini G, Filippetti I. Post-budburst hand finishing of winter spur pruning can delay technological ripening without altering phenolic maturity of Merlot berries. Aust J Grape Wine Res. 2020;26:139–47.
24. Palliotti A, Frioni T, Tombesi S, Sabbatini P, Cruz-Castillo JG, Lanari V, *et al*. Double-pruning grapevines as a management tool to delay berry ripening and control yield. Am J Enol Vitic. 2017;68:412–21.
25. Petrie PR, Brooke SJ, Moran MA, Sadras VO. Pruning after budburst to delay and spread grape maturity. Aust J Grape Wine Res. 2017;23:378–89.
26. Silvestroni O, Lanari V, Lattanzi T, Palliotti A. Delaying winter pruning after pre-pruning alters budburst, leaf area, photosynthesis, yield and berry composition in Sangiovese (Vitis vinifera L.). Aust J Grape Wine Res. 2018;24:478–86.
27. Gatti M, Pirez FJ, Frioni T, Squeri C, Poni S. Calibrated delayed-cane winter pruning controls yield and significantly postpones berry ripening parameters in Vitis vinifera L. cv. Pinot Noir. Aust J Grape Wine Res. 2018;24:305–16.
28. Frioni T, Tombesi S, Silvestroni O, Lanari V, Bellincontro A, Sabbatini P, *et al*. Post-budburst spur pruning reduces yield and delays fruit sugar accumulation in Sangiovese in central Italy. Am J Enol Vitic. 2016;67:419–25.
29. Moran MA, Bastian SE, Petrie PR, Sadras VO. Impact of late pruning and elevated ambient temperature on Shiraz wine chemical and sensory attributes. Aust J Grape Wine Res. 2021;27:42–51.
30. Zheng W, García J, Balda P, Martínez de Toda F. Effects of late winter pruning at different phenological stages on vine yield components and berry composition in La Rioja, north-central Spain. OENO One. 2017;51:363–75.
31. Sadras VO, Moran MA. Elevated temperature decouples anthocyanins and sugars in berries of Shiraz and Cabernet Franc. Aust J Grape Wine Res. 2012;18:115–22.
32. Poni S, Merli MC, Magnanini E, Galbignani M, Bernizzoni F, Vercesi A, *et al*. An improved multi-chamber gas exchange system for determining whole-canopy water-use efficiency in grapevine. Am J Enol Vitic. 2014;65:268–76.
33. Palliotti A, Tombesi S, Silvestroni O, Lanari V, Gatti M, Poni S. Changes in vineyard establishment and canopy management induced by earlier climate-related grape ripening: a review. Sci Hortic. 2014;178:43–54.
34. Gutiérrez-Gamboa G, Zheng W, Martínez de Toda F. Current viticultural techniques to mitigate the effects of global warming on grape and wine quality: a comprehensive review. Food Res Int. 2021;139:109946.

35. Mori K, Goto-Yamamoto N, Kitayama M, Hashizume K. Loss of anthocyanins in red-wine grapes under high temperature. J Exp Bot. 2007;58:1935–45.
36. Moran MA, Petrie PR, Sadras VO. Effects of late pruning and elevated temperature on phenology, yield components, and berry traits in Shiraz. Am J Enol Vitic. 2019;70:9–18.
37. Coombe BG, McCarthy MG. Dynamics of grape berry growth and physiology of ripening. Aust J Grape Wine Res. 2000;6:131–35.
38. Dami IE, Beam BA. Response of grapevines to soybean oil application. Am J Enol Vitic. 2004;55:269–75.

How to Cite This Article
Jouda FK, Alabojaml NHN. Literature review on the importance of pruning in agriculture grape garden. International Journal of Agriculture Natural Farming Research. 2026;2(1):47–51.
doi:10.54660/IJANFR.2026.2.1.47-51.