

*In recent decades, the traditional Italian pergola (or tendone) trellis system has been criticised by viticultural advisors, with many suggesting to growers that they convert to vertical shoot positioning. But, is the pergola trellis ready for the scrap heap?*

## The demise of the Italian pergola trellis

By Maurizio Gily<sup>1</sup>

In an article published in Italy's *Millevigne* magazine last year, Dr Francesco Iacono wrote about the modernisation of the Italian viticultural landscape, where many trellis systems are increasingly inspired by VSP and feature high planting densities, erasing the various growing traditions that exist in the regions. Iacono questioned whether this trend would result in the production of 'standard' wines that most consumers would prefer to avoid.

As a pergola system normally has fewer vines per hectare, critics say it produces too many buds and bunches for the vine to be in 'balance', impacting negatively on grape quality. The distance of the fruit from the ground is also thought to affect grape quality. This will be discussed later in this article.

In my home region of Piedmont, nearly all vineyards are cane-pruned to a VSP trellis. In my role as a consultant viticulturist, I first came into contact with a pergola trellis a few years ago in Abruzzo where the infamous tendone trellis is widespread. Together with my colleagues from the region, we took a close look at the tendone trellis and discovered that in spite of its reputation, some vineyards, particularly those that were well managed and in balance, produced excellent fruit that in some years was better than in adjacent VSP vineyards that had double the planting density (there are 1666 vines/ha in the classic pergola-trellised vineyard, compared with around 4000 vines/ha in a regular VSP). Over several years, we collected and published our extensive observations from comparative trials which although didn't prove the superiority of the tendone system, did not provide valid reasons for shunning it entirely. Other authors have since published articles on vine trellising, including the Institute of Saint Michele all'Adige which showed qualitative data on the 'pergola trentina' compared with other trellis systems, particularly for grapes and wine destined for the middle of the market, producing a good balance between yield

and quality. Last year, I visited the Sella e Mosca winery at Alghero, Sardinia, one of Italy's largest wine companies, which grows more than 500ha of vines, most of which is trellised to a pergola (in this case, the Sardinian pergola method). Sella e Mosca senior viticulturist Stefano Biscaro told me he did not believe that the pergola produced inferior quality fruit when compared with similar crop levels from other systems. The company continues to maintain the traditional trellis, adapting machinery to assist with its management. There are also growers in Valpolicella and other areas of north-eastern Italy, who are returning to the pergola.

It is not possible in this article to elaborate on the current debate in Italy for and against the pergola trellis, so I will focus on some of the more critical points, based on established theories and my own personal experiences.

### Vine spacing

In Europe, a low number of plants per hectare is usually considered a cause of poor grape quality, which is a criticism that can be levelled against the pergola trellis, where vines are usually widely

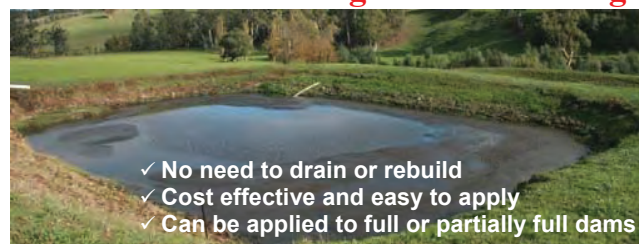
<sup>1</sup> Editorial director, *Millevigne* magazine, Italy. Email: [info@gily.it](mailto:info@gily.it)



A pergola-trellised vineyard in the Italian region of Abruzzo.

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**The amount of sunfleck patterns on the soil can be a good way to evaluate a vineyard's canopy balance.**

spaced (1500-2000 vines/ha). This is a controversial argument that I won't delve into here. Suffice to say, I see no reason why vines trellised to a pergola couldn't be planted at a density of 4000 per hectare or more. However, I don't believe this would result in a significant improvement in fruit quality from vines grown in fertile soils as the high vigour potential can cause closely-planted vines to become more crowded with shaded canopies, which can impact on ripening.

## Costs

Set-up costs for the pergola trellis are greater than most other systems but operating costs can be significantly lower. In a non-mechanised vineyard a VSP requires more labour hours for shoot-positioning and canopy management. However, in the pergola system, shoot-positioning is not required and canopy management is limited. The ability to utilise mechanisation on a VSP could make it more attractive, but only in larger vineyards; the average Italian vineyard is less than 4ha in area. When considering labour inputs, two issues work against the pergola trellis: the position of the arms makes harvest more difficult; and the overhead design makes it difficult to use with a modern tractor equipped with a cabin.

## Bunch exposure

Excessive shading of bunches is a common problem under an overhead trellis systems. This can increase the risk of fungal diseases and possibly lead to unbalanced fruit composition, with high levels of malic acid and green tannins observed in some varieties. However, this depends on the vigour of the canopy. A balanced overhead canopy allows sufficient sunlight, airflow and spray penetration that can reach the upper leaves and lateral shoots, which in the pergola trellis, grow up and over the roof. In a VSP system vigour can be better controlled by leaf removal, shoot-thinning and tip-trimming, while in a pergola this is nearly impossible; vine balance has to be achieved through preventive measures, such as balanced pruning, rather than corrective measures. However, these sorts of measures should also be undertaken with a VSP system. The amount of sunfleck patterns on the soil can be a good way to evaluate the canopy balance. For

late-ripening grapes such as Montepulciano, growers must remember that the sun is lower on the horizon later in the season, therefore, the shading and risk of disease under the pergola increases. In early-ripening grape cultivars this risk is much lower.

## Sunlight interception

The pergola trellis efficiently intercepts light, thereby giving the vine a higher yield potential. The VSP trellis is much less efficient at intercepting radiation from sunlight.

A simple way to estimate the efficiency of a canopy in capturing sunlight involves calculating the canopy surface area. It is a geometric calculation based on the measurement of the canopy, a technique quite well-known by many Australian growers. The ratio between the surface area and yield is a rough method of forecasting grape quality and this index should be around one (1:1) or more for quality wines.

## Distance of the grape from the ground

A popular perception in Europe is that grapes nearer to the ground 'feel' more of the earth's radiated heat and, therefore, ripen better. What is true is that near the ground, the temperature range is higher: warmer by day and cooler by night. In fact, in the pergola trellis, frost damage is rare and this explains its popularity in mountainous regions, such as Alto Adige, Northern Piedmont and areas of Argentina.

It is well known that temperature is an important factor in the maturation and quality of grapes, which works against the pergola. However, in a warm climate, although it may be preferable that temperature fluctuations are avoided, minimising the exposure of grapes to high daytime temperatures is more important. Similarly, in the pergola trellis, the fruit is often shaded at noon by layers of leaves, and partially exposed in the cooler hours from the sun's oblique rays. Moreover, in areas where the climate is influenced by coastal breezes, differences in temperatures between canopy layers could be less significant because the airflow tends to mix the warmer and cooler air.

## Conclusions

I am not a partisan of the pergola trellis but I emphasise that there are many aspects to the debate about the system. Growers must consider many aspects: the requirements of different varieties, the meso-climate, the desired wine style and vineyard production costs. Any changes introduced to traditional viticultural areas are difficult and can lead to many mistakes until the new techniques are completely understood and incorporated with local know-how.

## Acknowledgements

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