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TRELLIS VINEYARDS: A NEW REALITY FOR VINE AND WINE LANDSCAPES IN CASTILLA-LA MANCHA

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Vineyards are one of the most important agricultural operations in Castilla-La Mancha, covering an expanse of nearly 470,000 hectares in 2010 (46% of the area of Spain). Moreover, the existence of more than 700 agrifood industries related to vine and wine spotlight the financial strength of the sector. Over the last twenty years, farming operations and the agribusiness fabric have been undergoing an intense modernisation process fostered by the approval of the latest resolutions by the Common Organisation of the Market in Wine (Regulations 1493/1999 and 479/2008), which seek to enhance the competitiveness of European wines on international markets. This modernisation process is based not only on improving the crop itself, through varietal renovation, increasing irrigated areas and new types of vineyards, but it is also based on a commitment to innovation and quality wineries and Designations of Origin. One of the instruments used by the Administration to complete this transition and regulate the vine and wine production potential was agricultural adaptation and improvement programmes, more commonly known as vineyard restructuring and conversion programmes.

The purpose of this article is to draw up a preliminary assessment of the territorial scope of this measure within the vineyard restructuring and conversion programmes. In particular, we take a look at the significance that trellis vineyards have come to have for the territory in the main production zones in the region. Territorial repercussions can be approached from the perspective of the relationship established with the agrifood industry and zones with vine and wine production traditions, and more specifically, with the environmental consequences deriving from the use of water resources. An analysis of these consequences can be instrumental when various agents are seeking greater integration of sector policies that affect the territory.

I. VINEYARD RESTRUCTURING AND CONVERSION PROGRAMMES

The vineyard restructuring and conversion programmes were passed in Chapter III of *Regulation 1493/1999*. They were implemented in regions in which production did not match demand through a series of actions including varietal conversion, reintroduction of vineyards

and enhancements in management techniques. The acceptance of the Programme in Castilla-La Mancha has, since 2000, been a success, having looked at the amounts approved and the number of beneficiaries. In the first three campaigns, 71.3% of the nearly 100,000 ha included in the estimated conversion goal for a period of no more than eight years had been covered (Olmeda *et al*., 2003). From 2003 to the present, a yearly average of 65.5 million euros has been invested, for a total of 458.7 million euros and more than 19,000 vine growers receiving aid between 2003 and 2009.

1. Repercussions on the farming landscapes of Castilla-La Mancha: the trellis vineyard

These programmes have prompted important changes in the region's farm landscapes in the form of widespread use of new varieties and new types of vineyards. 18% of the 470,000 ha of producing vineyards in Castilla-La Mancha are trellis vineyards. The 86,825 ha registered confirm the structural relevance of this system within the region's farming practices, placing it above all the forage, legume and tuber crops for human consumption together. Broken down by province, Ciudad Real contributes more than one third of the area of the region, followed by Albacete and Cuenca, each of which hold about a quarter of the trellises in Castilla-La Mancha (26.2% and 22.5%, respectively). The leading role played by Ciudad Real is due to the existence of a series of municipalities of considerable size with important vine and wine traditions, which cover the most significant expanses of the region. If we analyse the overall results, we can see that seven out of the ten municipalities with the largest areas are located in this province, covering just over 17,000 hectares (20% of the total). However, the expanses are more evenly distributed in the other provinces, where the municipality of Villarrobledo is worth highlighting with its 5,797 hectares that account for 25% of the area in the province of Albacete.

The vineyards' exceptional capacity to adapt has prompted its spread throughout much of the region, except in mountainous areas and places with acidic soil. The central zone, corresponding to the "La Mancha" Designation of Origin, holds the largest expanses (61% of the total), along with other more peripheral areas located along the eastern edge (D.O."La Manchuela"), the southeast (D.O."Almansa"), northwest (D.O. "Méntrida") and south (D.O. "Valdepeñas"), although the trellis system has been used systematically in almost all of the region's Designations of Origin. In D.O. La Mancha, the growing methods adapt to the harsh Contintental Mediterranean climate, appearing on plains with deep sandy-clay calcium-rich soils. Growers in other Designation areas have also managed to adapt to the climate conditions, either mitigating its effects by planting in land near mountainous areas that act as protective barriers (D.O. Méntrida), or because they are under the influence of moist air currents coming from the Mediterranean, prompting improvements in the grape ripening process (D.O. Manchuela, Ribera del Júcar, Almansa). In addition to topographical and climate-related conditioning factors, the availability of water stands out as one of the determining factors for implementation of the trellis system, since the most important growing areas coincide with the main underground irrigation zones in Castilla-La Mancha.

Despite the fact that this type of vineyard can be cultivated in unirrigated land provided there is enough humidity, the arid summers that are typical of Mediterranean climates make the inclusion of support irrigation essential in order to enable the ripening process to be completed. Water consumption may vary depending on the variety grown and the humidity levels during the hydrological year. In general, however, the water requirements are estimated to be

moderately higher than traditional goblet-trained vines. According to consumption estimates made by the Administration and reflected in diverse agricultural-environmental plans implemented in the 1990s, estimated average consumption of trellis vineyards would be some 2,000 m^3 per hectare and year, compared to 1,500 of goblet-trained vines (Official Gazette of Castilla-La Mancha, 2003). The prevailing irrigation method is wired or wireless drip emitter irrigation, which is more efficient than sprinkler systems. This latter system is currently of little relevance, as it has been shown that localised irrigation is more efficient agriculturally and economically, thus giving rise to savings by allowing less water to be wasted through evaporation and also reducing production costs associated with labour requirements during irrigation seasons as well as expenses deriving from phytosanitary treatments to prevent excess moisture from sprinklers.

Therefore, the addition of irrigation can be considered an essential aspect of the vine growing modernisation process in Castilla-La Mancha, in both trellis vineyards and in goblet-trained vines, even though the reasons for introduction may differ. While irrigation was introduced in trellis vineyards in order to ensure the agricultural feasibility of the new varieties in highest demand on the markets, for goblet-trained vines this was done to increase productivity and guarantee the viability of many operations, which has further aggravated the problem of structural surpluses. The fact that the region lost more than 160,000 ha of unirrigated vineyard production between 1999 and 2009 evidences how successful the intensification of this crop has been.

II. TERRITORIAL DYNAMICS

Environmental dynamics are linked to the generation of new water demands in a territory that has significant water management problems. In Castilla-La Mancha, trellis vineyards consume 173.6 Hm^3, if we estimate an average expense of 2,000 m^3 per hectare and year. This figure means that trellis vineyards are already using more water than tubers, industrial crops, legumes and olive groves, only surpassed by irrigation of grains, vegetables and corn, which confirms its importance within the agricultural structure.

The results show that the introduction of the trellis system has not led to an increase in the region's water consumption in agricultural activities during the last decade, due to the reduction in the surface area of crops with high water requirements such as sugar beets, alfalfa and corn. Since 1999, the decrease in this type of crop has given rise to savings of 315 Hm^3 for the region, currently representing just 27% of consumption in the region. The causes for this decline lie in the significant water unit cost, which led to the abandonment of these crops in zones with limited water options and in the provisions of their respective market organisations.

Despite the drop in water consumption, we can see that the rate at which trellis vineyards have spread is similar to that of these speculative crops or crops with no regional tradition, highlighting the relevance of Common Agricultural Policy decision-making, which, as a general rule, has been implemented in a generic, across-the-board manner, without taking into consideration the specific features of different European territories. The aquifer in western La Mancha stands out as one of these territories in which the integration of sector policies is more urgent, given that, since 1994, it has been classified as a definitively overused aquifer by the Confederación Hidrográfica del Guadiana. At present, the aquifer accommodates 41%

of trellis vineyards in the region, with an estimated consumption of 70.8 Hm^3, which represents a third of the available resources, estimated at 201.6 hm^3 per year.

2.1. Social and economic dynamics.

In an effort to understand the relevance of the trellis system in traditional wine-growing zones, we have related the vine and wine production business concentration, weighted in a synthetic index, Z, which takes agricultural transformation companies, limited liability companies, public limited companies, joint ownerships and private wineries, with the percentage of trellis vineyards compared to the total municipal vineyards. The findings reveal that the territories covered by the largest total expanses of trellis vineyards are, however, of limited relevance within their respective municipal agricultural lands due to the specific strength that goblet-trained vines still have. In addition, we have found that there are other zones, distributed peripherally around the areas with the greatest concentration of businesses, which have up to 100% of their vineyards covered with the trellis system. This verifies the territorial dispersion of the conversion programmes, as new vineyards have been created in almost all the territories were this was possible.

These areas on the outskirts of the industrial clusters have little or no vine growing tradition, which leads us to consider the hypothesis that they have come about as a result of another kind of speculative dynamics. Despite the fact that the vine growers of Castilla-La Mancha are predominantly professional, we can see that other types of socio-economic agents have also proliferated, joining the region's vine and wine production from other production sectors, particularly the construction sector, starting from the nineteen nineties (Piqueras, 2008). In turn, in the municipalities in the region's central zone, which have percentages of 5 to 10%, the vine growers are predominantly direct, primary owners, and their motivation for undertaking the transformation was quite different than in the former case. In general, the conversion programmes have been seen as an opportunity to modernise their operations by improving mechanisation methods and, at the same time, reducing production costs in a sector affected negatively by low prices. In this regard, production costs per kilogram of the two prevailing grape varieties in Castilla-La Mancha (Airén and Cencibel) are considerably lower if they are grown on trellises: in the Airén variety, the production cost on trellises can be up to seven cents more economical than with goblet-trained vines on unirrigated land (0.17 cents compared to 0.24 per kilogram of grape produced), while the savings on the Cencibel variety can reach up to nine cents (0.27 cents compared to 0.36 per kilogram of grape produced). The estimate of lower costs for the trellis system is due to a higher yield per hectare and the higher alcohol content, since the expenses incurred for one hectare under the trellis system, estimating direct costs and general expenses, practically doubles those for goblet-trained vines. According to the calculations made, an end price of 0.0147 cents per kilo-grade (kilos per sugar unit) is obtained for the Airén variety using the trellis system and 0.0207 for Cencibel grapes. We have assessed the relation between costs and the most recent prices established in the two most important designations of origin in Castilla-La Mancha: La Mancha and Valdepeñas. Our findings show that current prices are slightly lower than production prices, and only the Airén variety grown on trellises in 2011 in D.O. Valdepeñas is profitable. These figures must be considered estimates, since the final production cost of

the harvest varies depending on the quantity produced, the alcohol content and the price agreed upon by each cooperative or agricultural transformation company with their respective partners. Moreover, the expenses estimated in this report may be reduced if the farmers perform certain tasks themselves.

CONCLUSIONS

Trellis vineyards have become the most visible element in the modernisation process of the vine and wine sector in Castilla-La Mancha, by combining the introduction of varietal renovation and optimisation through mechanisation of farming tasks, fostering the transition towards a production system based on innovation, competitiveness and quality. With an area covering nearly 90,000 ha, this crop is currently significantly represented and widespread in Castilla-La Mancha, which has contributed to the process of production diversification in many agricultural zones in the region. However, the traditional vine and wine zones have the largest areas within the prevailing goblet-trained vine system for the white Airén or Manchego variety.

The appearance of these 90,000 new ha has caused an evident impact on the territory. While we do not question the progress experienced by the vine and wine production operations in improving their profitability and better meeting market needs, we consider that the across-the-board implementation of the Common Organisation of the Market in Wine in diverse territorial contexts in Europe entails a risk factor, given that, at least in the initial stage, it does not take into account the characteristics and weaknesses of each of these territories. The need for this becomes even more unavoidable when we are dealing with measures of such spatial magnitude as pulling up vines and restructuring and conversion of vineyard programmes in a region with a significant vine-growing tradition and territories with serious sustainability problems. Pulling up the vines is clearly a negative approach in a region in which grapevines are an integral part of the landscape, damaging the environment by leading to erosion and desertification, and harming society by abandoning a traditional type of vineyard which helps define landscapes of unquestionable value as scenery and heritage. Regarding the conversion programmes, the expansion of trellis vineyards is disputable because it has been done in territories with significant social and environmental conflict, such as La Mancha Occidental aquifer, which has been classified as definitively overused since 1994, where there are already 35,400 ha under the trellis system. In this area, it would be logical to think that the introduction of new types of vineyard and/or mechanisation under the trellis system should have been carried out in a more orderly and prudent fashion, in coordination with the other administrative departments, especially the departments of the environment and agriculture, as the trellis system has become yet another element placing pressure on the diminished water resources in this territory. This, in turn, places proposals aimed at effective and intelligent management of resources, such as the Water Framework Directive and other policies set forth specifically by the environmental administration, such as the *Special Plan for the Alto Guadiana* and the latest Hydrological Plan of Cuenca, at risk.

In conclusion, the integration of sector policies that affect the territory is one of the most important tasks to be undertaken by the public administration, and this issue is particularly complex when dealing with a resource that is as multi-purpose and strategic as water.