What are the prospects for organic vineyards? A bio-economic evaluation using mathematical programming

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Organic agriculture offers an attractive framework for sustainable farming in terms of the environment, socio-economic and institutional aspects (Capitaine et al., 2009). In spite of the advantages, farmers are more often than not reluctant to convert fully to organic vineyard for they consider that, over and above any technical constraint, farm subsidies do not sufficiently compensate for the uncertain yields and market prices for their products. The purpose of this paper is to evaluate, at short-term and long-term, using a bio-economic approach, the farmer strategies in terms of production system (conventional or organic farming) given uncertainties related to prices, yields and subsidies granted to organic agriculture.

Materials and Methods

A bio-economic model was developed and then applied to a vineyard domain (48ha) in the Languedoc Roussillon administrative region of France for the first year of conversion. The domain embraces six varieties of vineyard on 16 plots. There are different types of soil on the domain, parts of which are intercropped with grasses, while on others salt rises to the surface. The model makes use of survey data (technical and economic) (Polge de Combret, 2009) revealing that, expressed as an average, organic vineyard yield variability is 30% higher than that of conventional viticulture. The model was used to perform short-term (4 years) and long-term (20 years) simulations, bearing in mind uncertainties related to prices, yields and production system (vine variety, soil, grass cover) to test several hypotheses in the form of scenarios:

1- Scenario **(1)**: this scenario aims at testing the hypothesis that where there is no subsidy but where risk prevails (prices, yields), a switch to organic vineyard is systematically less profitable than conventional one.

2- Scenario **(2)**: the level of the current subsidy for conversion to organic vineyard (350 € /ha) is insufficient for full conversion. This scenario involves biophysical and economic determinants that prevent full conversion.

3- Scenario **(3)**: the level of subsidies granted and the level of uncertainty in respect of yields prevent the farmer from switching to organic farming. The greater the perception of uncertainty, the higher will be the level of subsidy for full conversion. This scenario determines, in the short-term, the amount of the subsidy for three organic farming yield variability levels compared with conventional viticulture (0%, 16%, 33%).

These scenarios were evaluated by analyzing yields (Tonnes/ha), the farm gross margin (Euros/ha) and the selected cropping system (vine variety, soil, grass cover).

Results and discussion

Scénario **(1):** Table 1 shows that 14% of the area of the domain switches to organic vineyard (OV), i.e.: 7 hectares. The Grenache plots are the only plots to switch to OV and that only partially (65%). The other vine varieties continue to be grown with CV methods. These plots result in a relatively high margin (3746 €/ha) and a less significant interannual yield variability (34%). This particular conversion involves above all non-grassed plots (80%) compared with 55% for grassed plots that could be explained by significant costs surrounding grassed plots in OV (2609 €/ha) and a greater yield variability (1%).

Scenario **(2):** 29 ha only switch to organic viticulture, i.e.: 60% of total surface area. It will be noted that the switch is complete for the Grenache and Carignon plots, that conversion is partial for Roussane and Sauvignon while Merlot and Cabernet plots remain with conventional vineyard (table 1). Vine variety switching to OV are those whose average gross margin is the highest (data not shown). OV yields on Merlot and Cabernet plots are the lowest because the soil contains salt on those plots. Roussane is also grown in the salty areas but yields are higher. This vine variety is less sensitive to salinity (expert knowledge).

Table 1 Changes of surface area in respect of organic vineyard (OV) and conventional viticulture (CV) by vine variety and according to scenario.

vine variety	Total surface area (ha)	Scenario 1		Scenario 2	
		CV (ha)	OV (ha)	CV (ha)	OV (ha)
Merlot	14.2	14.2	0	14.2	0
Grenache	10.6	3.7	6.9	0	10.6
Carignan	13.4	13.2	0.2	0	13.4
Sauvignon	3.3	3.3	0	1.7	1.6
Cabernet	2.5	2.5	0	2.5	0
Roussane	4	3.8	0.2	0.8	3.2
Total	**48**	**40.7**	**7.3**	**19.2**	**28.8**

*total surface area before switch to organic

Scenario **(3):** Figure 1 illustrates that the conversion rate is the same for all yield variability levels. The greater the variability, the higher the level of subsidy for total conversion. For a yield variability of 33%, 2800€/ha is required to enable the whole surface area to switch to OV. Upwards of 2450€/ha conversion becomes practically total whatever the uncertainty of yield. The rate of conversion varies according to cepage, the least favorable cepages switching last (Merlot).

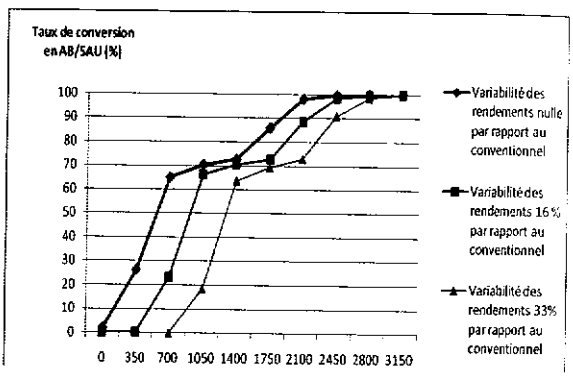

Figure 1. Variation of the amount of the subsidy depending on organic yield variability compared with that of conventional viticulture (0%, 16%, 33%).

The findings reflect the reticence of farmers to convert to OV. Production strategies depend on the characteristics of the biophysical system (vine variety, salinity, grass cover). Plots under the more favorable conditions switch more rapidly to OV than do the others. Results show that the model used can factor in several elements involving uncertainties related to conversion to organic vineyard and related to cropping system and can offer a response to complex situations integrating various components – biophysical, technical, economic and even environmental.

References

Capitaine, M., David, C., Freycenon, R. 2009. Evaluation et amélioration de la durabilité de l'agriculture biologique : éléments de débats. Innovations Agronomiques, Vol 4, p. 209-215.

Polgedecombret, L. 2009. Estimation économique sur le domaine le Pive. Rapport interne.p.14.

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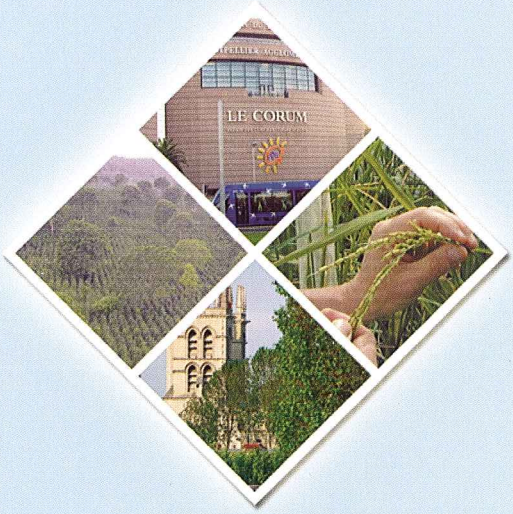

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