

CULTIVATION FORMS AND VITICULTURE MODELS ADAPTING TO ADVERSE "ENVIRONMENTAL" CONDITIONS

G. Cargnello¹, Đ. Peröuric², M. Oplanic²

¹ Sezione di Tecniche Colturali Istituto Sperimentale per la Viticoltura

Conegliano (TV) (ITALY)

tel.: ++ 39 043 8456747

e-mail: cagnellogiovanni@libero.it

² Institute for Agriculture and Tourism Porec (CROATIA)

tel.: ++ 385 52 408300

e-mail: milan@iptpo.hr

ABSTRACT

One of the main problems in viticultural production in Istria (Croatia) is a labour shortage in periods of intensive works, mainly during summer, respectively during tourist season. This problem came out as a consequence of active agricultural population decrease provoked mainly by its transition in other, more profitable activities, more likely tourism. Therefore, the aim of this article is to offer organisational-technological solutions in viticultural production, needing less human labour, especially during summer months, without influencing the economic-financial aspect of this production.

Authors give proposals in order to relieve this problem. Two solutions are considered as basical: 1. using the adequate cultivation models, respectively establishment of a model suitable for a mechanisation of working operations;

2. choice of late ripening grape cultivars, respectively those to ripen after a summer tourist season.

KEY WORDS

Active agricultural population, cultivation forms, viticulture models, cultivars of grape, environmental conditions, Istria, Croatia

1. INTRODUCTION

Viticulture represent one of the main agricultural branches in Istria (Croatia). The importance is even bigger if considering that in 1999, 85,36% of total vineyard surfaces, or 5.541 hectares was in possession of family householdings. Could be said that in Istria there isn't a householding with no viticulture and vine production, at least for one's own needs. In majority a viticulture is traditional and technologically obsolete. The main characteristics of viticulture traditional technology is human labour high need, approx. 600-800 hours per hectare yearly.

Structural changes in economy fluctuations in Istria in last 30 years, mainly tourism development, have caused a translocation of agricultural population in more profitable economic branches, which has a negative consequences on total agricultural production and thus viticulture.

The main goal of this paper is to show trends of total disposable labour in agriculture, and point to some possibilities of viticulture adjustments to actual socio-economic conditions in Istria. Respectively to offer some technological solutions and cultivation models aimed to a decrease of total human labour force, shifting of labour force consumption peaks, and finally to a fall of competition with other economic branches, mainly tourism.

2. DATA SOURCES AND METHODS

In this paper are primarily used a secondary data sources, in most cases from State Institute of Statistics, Employment department and empirical knowledge's. Original data from our researches have been obtained for human labour consumption comparison between three viticulture cultivation models: Guyot traditional, Cordone with short cut with high hand work need and Cordone with short cut and high level of mechanisation.

For data elaboration, methods of comparison, analysis and synthesis, statistical and economic methods have been used.

3. PROBLEM DESCRIPTION

One of the momentarily biggest problems of total agricultural production, especially of viticulture in Istria is a human labour force shortage caused mainly by to occurrences:

- agricultural population decrease, in relative and absolute mean;
- development of other economy activities, mainly tourism; from the aspect of human labour force needs period and intensity, tourism and viticulture are competitive.

3.1. Fluctuations of total and agricultural population in Istria

The first population census in Istria was published in 1841. when 101.774 inhabitants lived here, from which 83.455 or 85% at the time was agricultural. Fluctuations of total agricultural and active agricultural population in Istria is shown in table 1.

Table1. Population number fluctuation in Istria from 1936 to 1991.

Population category	Year						Index 1991 (1936=100)
	1936.	1953.	1961.	1971.	1981.	1991.	
Total	228.420	175.094	176.838	175.199	188.332	204.346	89,5
Total active	127.522	73.210	74.897	71.013	82.876	91.175	71,5
<i>Active share in total</i>	55,8	41,8	42,4	40,5	44,0	44,6	
Agricultural	143.905	78.442	59.240	36.967	12.043	7.030	4,9
<i>Agricultural share in total</i>	63,00	44,80	33,50	21,10	6,39	3,44	

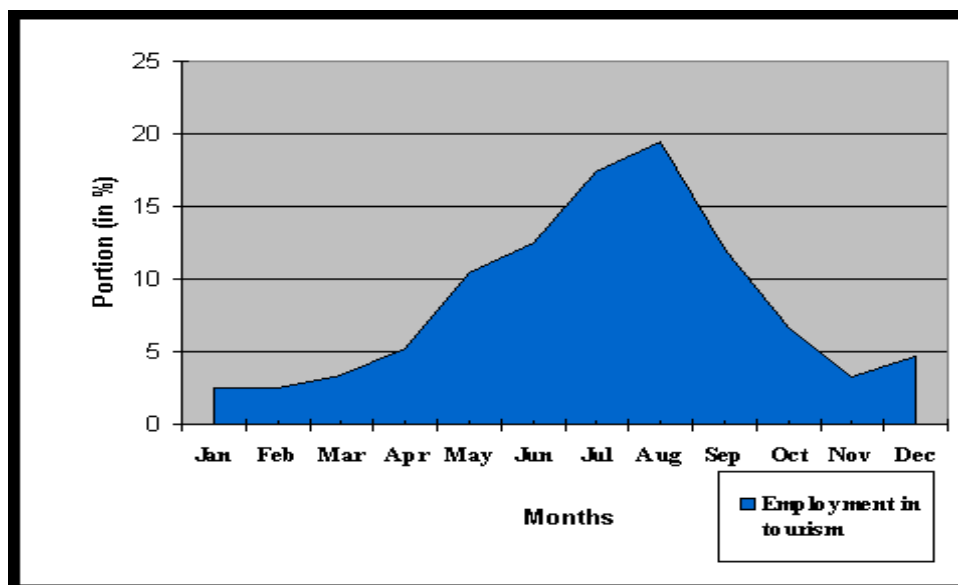
(%)							
Active agricultural	76.629	32.832	25.081	14.987	6.418	3.888	5,1
<i>Active agricultural in total active (%)</i>	<i>60,09</i>	<i>44,85</i>	<i>33,49</i>	<i>21,11</i>	<i>7,74</i>	<i>4,26</i>	

Table 1 shows that during the century numerous significant changes in the number of total and especially agricultural and active population in Istria have occurred, which is primarily a result of numerous political and socio-economic changes. The agricultural density coefficient, i.e. the number of inhabitants per hectare of arable land rose from 1.72 in 1953 to 2.53 in 1991. In the same period, the average arable area per agricultural inhabitant rose from 1.30 hectares to 11.46 hectares (Legović, 1997).

When we speak about the labour force on family farms in Istria we must bear in mind that it almost only consists of family members. An average household has 4.31 members, 2.74 of which (63.6%) are active, i.e. aged 15 to 60. On average, there is 0.81 active members working only on the farm per household, whereas the remaining active members (70.2% of the total number) work outside the household, and for them working in agriculture on the family farm is a supplementary activity. They are the so called "part time" farmers, and their households are categorised as mixed or pluriactive as regards the source of income. Such small holdings make up 54.60% of all holdings (Milotić, Oplanić, 1999). The same research also shows that there are 6.62% of family holdings without a single active member, i.e. they are old people's holdings.

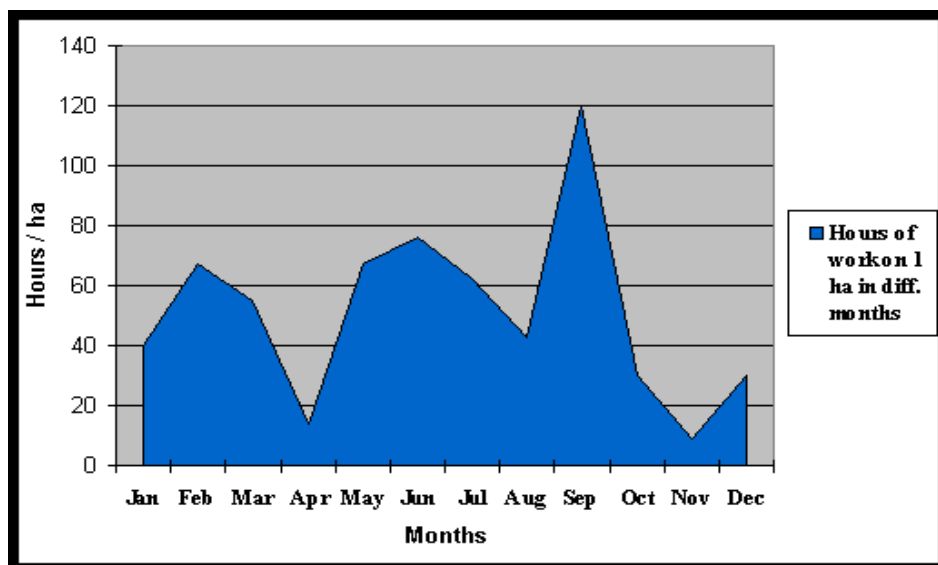
3.2. Needs for labour force in Istrian tourism

Tourism, in addition to a series of positive effects on the development of agriculture and viticulture, such as the consumption of agricultural products, the influence on their standardisation and the development of processing facilities, also has some negative effects, the most important of which is their competitive requirement for work force as regards time and intensity. Graph 1 shows the volume of employment in Istrian tourism in various months.



Graph 1: Portion of total employment in tourism in Istria in different months

The graph above shows that the largest needs for work force in tourism are in the June - September period, when 4 to 8 times more workers are employed than in the remaining, out of season, period. In the vineyard business it is the period of vegetation, i.e. intensive works. When traditional models of training vine are applied, it is easily noticeable that there is an overlapping need for labour (graph 2).



Graph 2: Employment of work force in viticulture (traditional training system) in different months and the period overlapping with tourism

Source: Peröurić, Đ. and co-operators: Vinogradarsko-vinarska proizvodnja u obiteljskim gospodarstvima za potrebe turizma, HAZU, Zagreb, 1994.

The viticulture with the most common technology on Istrian small holdings asks for a lot of labour, especially for some seasonal works. Thus greater importance should be paid to research with the main aim of introducing new technological alternatives which reduce human labour and distribute it more evenly during the whole vegetation period. This would lessen the shortage of work force during seasonal works in vineyards, which largely overlap with the tourist season. The aim of this work is to offer organisational and technological alternatives in viticulture which will require less human labour, primarily during the summer months, without reducing the economic and financial effects of viticulture.

1. POSSIBLE ALTERNATIVES

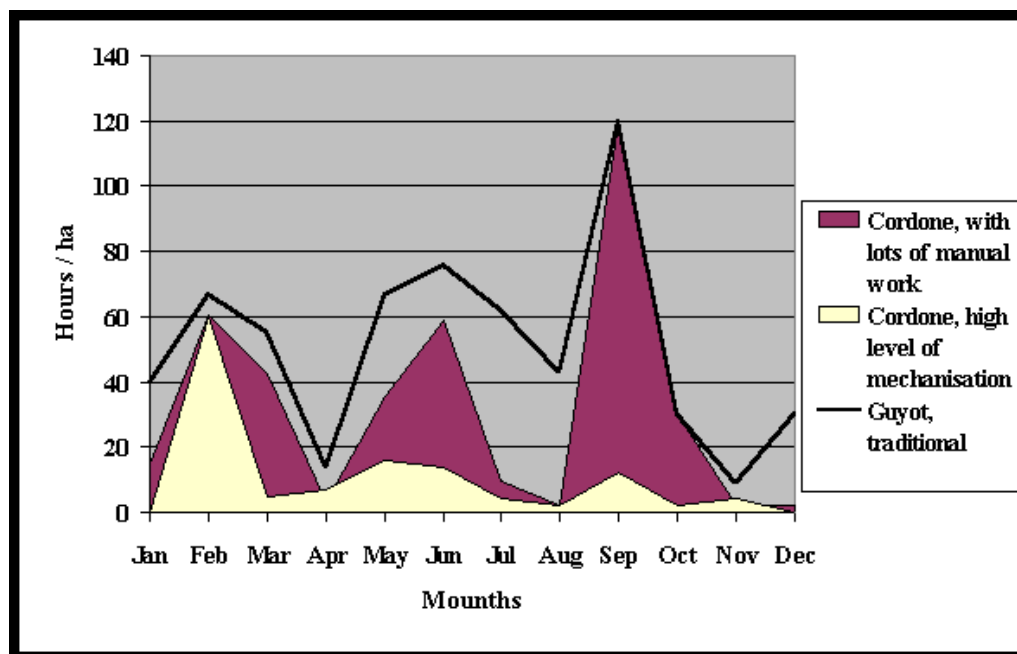
Concerning the noticed problems connected with available work force necessary for carrying out the jobs in viticulture, especially during the tourist season, some alternatives could be suggested to alleviate the problem.

1. Application of an appropriate training system that reduces human labour.

The graph that follows shows three parallel models of training vine:

- traditional Guyot system
- Cordone with lots of manual work
- Cordone with high level of mechanisation

Graph 3: Parallel picture of use of labour in different training systems



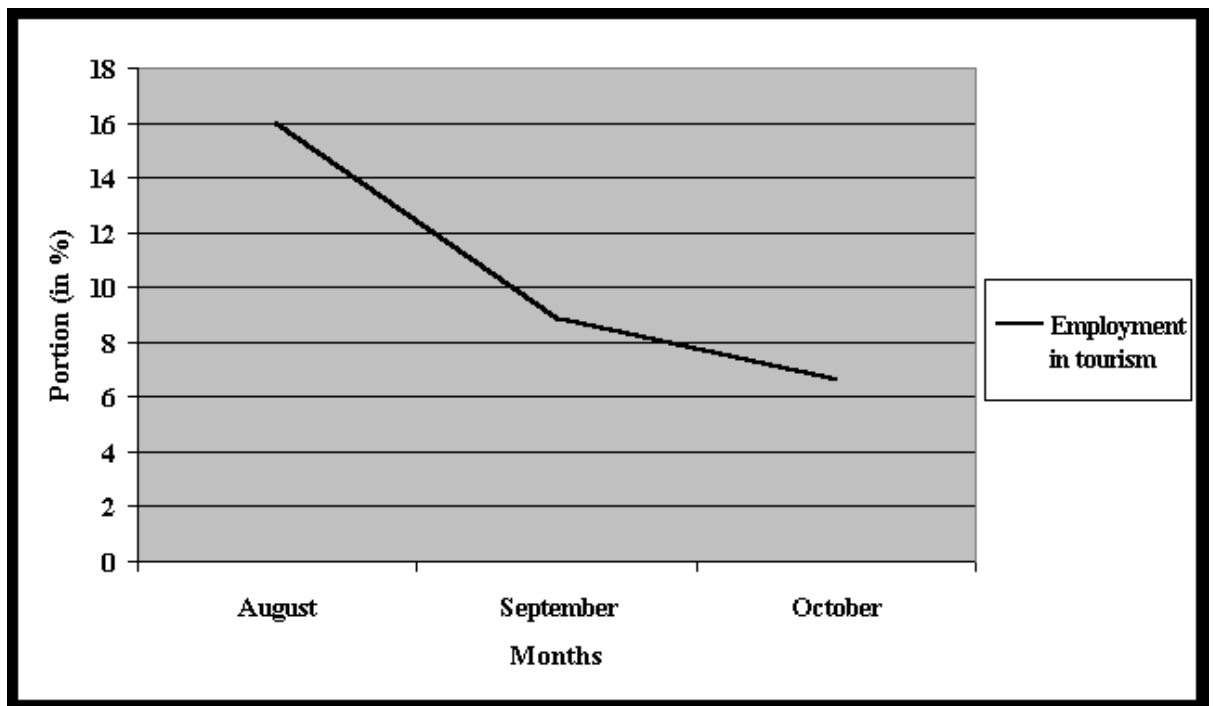
Sources: 1. Peröurić: Vinogradarsko vinarska proizvodnja..., IBID, p 150.

2. Own research

On basis of the data from graph 3 we can conclude that the best training system for small family holdings in Istria is the Cordone with maximum mechanisation of work operations. This training system requires 487 working hours per hectare less (269 of which fall in the period of tourist season) than the traditional Guyot system. Labour is also largely saved in relation to Cordone which requires a lot of manual work. With maximally mechanised working operations 255 hours per hectare can be saved annually, 158 of which in the tourist season.

2. By choosing an appropriate vine cultivar one can influence the harvesting time. The previous graph showed that the highest needs for labour occur at manual harvesting: 150 hours per hectare or 24% of total labour. Thus it would be clever to, among other factors, think about the ripening time when choosing a vine cultivar. In that case the more acceptable cultivars would be the ones that ripen later, i.e. after the tourist season has passed its highest peaks. The following grid shows ripening times of various vine cultivars.

Graph 4: Parallel picture of employment in tourism and certain cultivars' harvesting times



Source: Mirošević, N. (1993): Vinogradarstvo, Globus, Zagreb.

Graph 4 shows that the vine cultivars that are most grown in Istria ripen between 3 September and 10 October. The earliest to ripen, at the beginning of September, are Chardonnay and Pinot sivi, which is not suitable since there is still high employment in tourism. Muökat bijeli, Malvazija, Muökat ruža Porečki, Borgonja, Merlot and Cabernet Sauvignon ripen 15-20 days later, which is a short, but regarding the available work force, important period since the employment in tourism falls by 5%, or some 7000 workers. To illustrate the numbers, we can say that if this work force were employed in harvesting, it could harvest some 3700 hectares of vineyards with an average yield of 10 tons of grapes per hectare.

The last to ripen among the quoted cultivars is Teran - about 10 October. That is a suitable period since there is a further fall in employment in tourism, but not so suitable if we think about the availability of students as a possible work force during the harvest, since they have their school and university obligations at that time.

2. CONCLUSION

According to the number and structure of population at small family holdings and the need for labour in tourism, we can conclude that in Istria there is a limited availability of work force that can be engaged in viticulture, or that it is a limiting factor for the further spread of this activity. To lessen the effects of these negative phenomena for viticulture, it is necessary to work on modifying the technology and training systems in viticulture that could lead to reducing the number of hours of human labour, especially during the summer months and tourist season. The shortage of work force in viticulture, especially during the summer months, can be significantly alleviated:

1. by applying the Cordone training system, with maximal mechanisation of working operations
2. by higher representation of the vine cultivars that ripen later, i.e. after the end of the summer tourist season. Particularly, that can be autohton cultivars with high qualitative and social-economic value which existed in Istria, like Muscat bijeli, Malvazija, Teran,

Borgonja, etc.

3. BIBLIOGRAPHY

1. Milotić, A., Oplanić, M. (1999): *Poljoprivredno stanovništvo i zaposlenost u Istarskoj županiji*, 3. znanstveni skup hrvatskih agronoma, Zbornik sažetaka str. 46, Opatija,.
2. Peröurić, Đ., Milotić, A., Tomčić, Z. (1994.): *Vinogradarsko-vinarska proizvodnja na obiteljskim gospodarstvima za potrebe turizma*, HAZU, Zagreb.
3. Peröurić, Đ., G. Cargnello, M. Oplanić. (1999): *"Economic and social aspects of winw-growing on different cultivation forms in Istria"*, 11th Meeting GESCO, Sicily (Italy), Zbornik radova, vol. 1, page: 448- 453.
4. Cargnello, G., Ferraris, A., Forno, S. (1989): *Costi di produzione e allevamento della vite*, Rivista di frutticoltura e di ortolforicoltura, Edagricole, Bologna.
5. Miroöević, N. (1993): *Vinogradarstvo*, Globus, Zagreb.
6. Legović, M. (1997.): *Uzroci zaostajanja poljoprivredne proizvodnje Istre i mogućnosti razvoja 1880-1975.*, Institut za poljoprivredu i turizam, Poreč.
7. Statistički ljetopis hrvatskih županija (1993), Državni zavod za statistiku, Zagreb.