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COMPARATIVE ANALYSIS OF ORGANIC AND CONVENTIONAL FARMERS AND THEIR FARMING SYSTEMS. WHERE DOES THE DIFFERENCE LIE?

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Abstract

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The adoption of non-conventional agricultural practices, such as biological agriculture, forms a realistic and quite feasible alternative for Greek agriculture, within the context of a new agricultural production model in a constantly changing and challenging environment.

The aim of the present work is the analysis of social characteristics of biological and conventional viticulturists with emphasis on the incentives affecting their decision towards adopting biological agriculture, as well as the comparative analysis of viticulture farms economic performance under organic and conventional management practices.

This study was based on original research, carried out in Greece and more specifically in the Central Macedonia region. It was performed by use of two questionnaires addressed to two separate groups of viticulturists (organic and conventional ones) and was filled through personal interviews, during the period 2004-2005.

Study results revealed that there is a considerable differentiation regarding not only social characteristics of biological and conventional viticulturists (age, education, agricultural experience, access to information), and their incentives for the adoption biological agriculture, but also between the two production systems (organic and conventional ones), regarding yields, production costs and profitability.

Key words: comparative analysis, vineyard, biological agriculture, social characteristics

Introduction

The agricultural community universally sheds light at the biological or organic agriculture, due to the controversies that are expressed over the practices of conventional agriculture and especially over the problems that it provokes with its implementation (Mpeopoulos, 1997).

In the past few years, biological agriculture has been more and more attracting the interest of producers and consumers alike, aiming at the creation of a sustainable production system with a capacity to sustain and protect nature and the landscape, as well as to minimize environmental damage induced by existing agricultural practices (Pacini et al., 2003; Lund and Algers, 2003).

This is mostly attributed to the fact that the above mentioned form of agriculture is a realistic and fea-

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sible proposal within the bounds of a new agricultural model, in a constantly changing and competitive environment. It's a typical case of adopting new technologies and innovations that can lead to a qualitative differentiation of the agricultural production (Pantzios et. al, 2002) and it is also considered to be a model that can possibly enhance viability in agriculture (Padel et al, 2002).

There is a variety of definitions on the concept of biological, ecological or organic agriculture (Rigby and Caceres, 2001; Pacini et al., 2003). According to Lampkin (1997), biological agriculture can be defined as a form of farming, which aims to a sustainable social, environmental and economic welfare by acting in three ways; it minimizes the use of external inputs, it maximizes the use of renewable sources and the exploitation of the agricultural ecosystem and, finally, it uses the market in order to counterbalance the external expenses.

According to the above definition, biological agriculture embraces all the principal objectives of sustainable agriculture and is by definition a sustainable system itself, having a positive effect on the environment as well as the human society (Henning et al., 1991; Lamkin, 1997).

Biocultivation was only introduced in Greece as late as at the beginning of the 80s, mostly by foreign venturers. The production of biological or organic produce was limited (mostly to olives and vines) and regionally confined in the Peloponnese area (Mpeopoulos, 1997). Upon implementation of regulation 2092/91, biological agriculture expanded not only regionally but also through the whole spectrum of agricultural products (Papadaki-Klavdianou et al., 2000).

However, its size remains quite restricted, forming only a small part of the agricultural sector, with biocultivated land reaching a mere 3.02% of agricultural land in use (2006) (Oxouzi, 2008).

Central Macedonia is nowadays the region with the highest number of hectares under organic management in Greece and the second most important in the country, as far as the implementation of biological viticulture is concerned.

Literature Review

The rapid rise in biological agriculture, on a European as well as on a global scale in recent years, has provoked a rising need for extensive research on this alternative production system, from a social as well as from an economic point of view, leading to the implementation of a series of comparative studies on biological and conventional producers.

Results from several research studies indicate that, biocultivators are better educated and younger in age than conventional cultivators, while most of them come from an urban environment and have little experience in agricultural matters (Padel and Lampkin, 1994; Padel, 1994, Lockeretz, 1995; Lipson, 1999; McCann et al., 1997 and Boz et al., 2005). This can be attributed to the fact that organic producers entered the agricultural sector quite recently, i.e. later than conventional ones and according to Lockeretz (1995) their incentives are not purely financial.

Lohr and Samuelsson (2000), while studying the impacts of financial support on biological agriculture in Sweden, pointed out that adequate informative action and familiarisation are far more effective in causing a shift towards biological agriculture than any form of financial support. This may be attributed to the fact that those farmers who are deprived of easy access to governmental agencies and in some cases are minimally educated, face greater difficulties in understanding new technologies and consequently adopting organic farming methods (Tzouvelekas et al., 2001). The above findings are further corroborated by the research studies conducted by Chaves et al. (2001), Strauss et al. (1991) and Caffey et al. (1994). They discovered that producers of a higher educational level have the tendency to adopt new technologies in higher frequency or easily. Similar trends are observed in the case of producers who form cooperatives and have continuous access to up-to-date information (Adesina et al., 2000; Caviglia-Harris, 2003).

As far as economic performance of the two respective production systems is concerned, research conducted in Bangladesh, by Rasul and Thapa (2004), using a sample of 45 biological and 65 conventional

farms, showed that rice, wheat, even potato biocultivation yields, are by 6.3%, 7.4% and 0.65% respectively behind those produced with conventional agricultural practices. Similar conclusions were also reached by Green (2002), following long-lasting research conducted in Sweden, whereby results indicated that organic potato yields merely reached 58-60% of that of conventionally grown ones, and similarly organic wheat yields approximated 90% of conventional production systems.

By comparison of 15 conventional and organic viticultural farms, White (1995) concluded that biological viticulture yields were lower than the conventional ones by 5-35%, depending on the variety.

Furthermore, a comparative economic study on biocultivated and conventionally produced kiwi, by Campbell et al. (1997), indicated a lower (by 20%) organic kiwi yields compared to those conventionally produced. It also became evident that biocultivation input costs were slightly higher (by 10-20%) than those of conventional practices, which can be attributed to the use of high cost biological compounds and fertilizers.

Research studies performed by Offerman and Nieberg (1999, 2000) in several European countries, showed that organic farms reached lower yields, slightly lower costs and higher producer prices than conventional ones. As a result, the average profitability rates of organic farms exhibited a deviation of -20% to +20%, in comparison to average profitability rates of conventional ones.

Lyngbeak et al. (2001) compared biological and conventional coffee bean production farms for three years (95-98) in Costa Rica and concluded that organic farm yields were lower than those conventionally reached, by 22%. However, higher producer prices as well as subsidies equalized organic and conventional farmer net profit.

Pacini et al. (2003), in a research conducted in Toscani, concluded that organic farm gross income was higher by 7% than the one attained by conventional farms. This can be attributed to the combined contribution of two crucial factors: firstly, the higher prices organic produce can get in the market and secondly, the lower variable costs in the production process. The above further corroborate Lampkin and Padel findings (1994), who mention that organic wheat and pulses variable costs in Great Britain are less than 60% of those incurred in conventional farms.

Lockeretz et al. (1985) carried out a five-year-long comparative study of organic and conventional farms in the U.S. (Washington University). According to their techno economic results, gross annuity per hectare was lower for organic farms by 6-17%. Biological farms, however, had lower production costs, the main reason for such differentiation being lower fertilizer and pesticide expenditure. Lower input costs contributed to counterbalancing low-value production in organic farms. As a result, net profit per hectare of cultivated land reached similar levels for both groups.

Wynes and Edwards (1990) compared equal numbers of biological and conventional farms (16 in total) in southeastern Australia, for the 1985-86 farming period and found that organic farmers' average gross income corresponded to 69,0% of that of conventional ones, while their costs and profits 59% and 78% of the latter respectively.

In conclusion, we could safely state that comparative research so far points to the fact that economic performance of organic farms is definitely behind that of conventional cultivators, in most cases.

Research Methodology

The survey was conducted in Central Macedonia by means of questionnaires, which were filled in during personal interviews, in the period 2004-2005.

In order to ensure maximum research reliability and effectiveness, two different questionnaires were laid out, one for each separate case, i.e. organic and conventional viticulturists. Questions were identical or similar for each producer group, while their number differed per case.

The sample field included the entire population of vine biocultivators (40 cultivations) from the records of the Directorate of Rural Development and Food in every county, for the year 2003, while the sample selection of 128 conventionally managed farms was

made via the stratified random sampling method, which is considered to be the most effective for farm sampling (Siardos, 1997).

Data processing was performed by use of the statistical package SPSS 14.0 for statistical analysis.

Results

A) Social characteristics of organic and conventional viticulturalists and reasons-incentives for the adoption of organic viticulture

Biological Viticulturists: The majority of the organic producers are male (97.5%), aged 35-50 (57.5%), with an average age of 44.6 years and married (90.0%).

Most interviewees (80.0%) come from an agricultural background, are part of a cooperative or a producer group (60.0%) and have never before received any other kind of financial support apart from the one granted by regulation 1278/92 (52.5%). What is remarkable is the fact that 67.5% of biological viticulturists have attended some kind of training program or seminar on farming or biological agriculture.

As far as their educational level is concerned, this is relatively high (average schooling time: 13 years). More specifically, 45% are high school graduates, 40% hold a University or a Technological Education Institution degree, while a low 12.5% have merely completed the required by law 9 years of compulsory education and an even lower 2.5% have attended elementary school for 6 years or less.

It is worth noting that only 55% are in farming as their main occupation, with 66.7% of them reporting not having any secondary occupation.

The majority of biological cultivators view their occupation with farming as a way of life (55.9%), while family tradition and lack of alternative options form the main reasons for their occupational choice by 40.0% and 5.0% respectively.

The majority of the people asked (47.5%) had been in conventional agriculture (before entering biological agriculture) for almost 15 years, 37.5% were conventional farmers for about 15-25 years and a mere 5.0% for over 35 years, while average time in conventional agriculture did not exceed 12.5 years.

According to the results of the survey, 45.0% of them have been using biological viticulture methods for almost 5 years, 42.5% for 5-9 years and 12.5% for over 9 years.

The main incentives for viticulturists' engagement in organic viticulture are: product quality improvement (1st), higher prices (2nd), the protection of the environment (3rd) and better long-term prospects (4th). On the other hand, the ease in market placement (5th), subsidies (6^{th,}) as well as their involvement in organic vineyard management as an alternative option for them (7th) did not count as a high incentive for entering organic agriculture.

Conventional Viticulturists: The majority of the conventional producers are male (96.1%), around the age of 35-50 years (39.8%), with an average age of 49.1 years and married (82.8%). A high 94.5% of them come from an agricultural background, are members of cooperative or producer group (75.8%), have received some kind of financial support in the past (71.1%), while the majority (66.4%) have never attended any training programs or seminars on farming or biological agriculture.

According to the results, average schooling time of conventional cultivators is 9 years. More specifically, 38.3% of the conventional producers have attended elementary school for 6 years or less, 24.2% have graduated from secondary school (9 years), an equal number have successfully completed the full 12 years of elementary and secondary education, while 13.3% hold a University or a Technological Education Institution degree.

The majority (78.1%) are in farming as their main line of work, with 76.8% of them reporting not having any secondary occupation.

Family tradition is considered by 46.1% of the people asked as the most important reason for choosing a farming occupation, while the way of life, as well as the lack of alternative options account for their occupational choice by 35.9% and 18.0% respectively.

A percentage of 39.8% of conventional cultivators have been in farming for over 35 years, 17.2% for 25-35 years and 18.0% for 15-25 years. It is worth noting that as many as 25.0% of the producers could be considered as newcomers, since they have a farming experience of less than 15 years, rather short compared to the average 30 years of agricultural experience viticulturists have as a whole.

Main reasons-incentives, which would turn conventional viticulturists to adopt such an alternative production system, are higher prices (1st), subsidies (2nd), easier market placement (3rd) and better long-term prospects (4th). In contrast, product quality improvement (5st), the protection of the environment (6th) and their involvement in organic vineyard management as an alternative option for them (7th), did not count as a high incentive for entering organic agriculture.

Despite certain reservations and skepticism 43.8% of conventional farmers state that they are considering the option of adopting organic framing methods in the next few years.

From the above findings two different profiles may be extracted and schematically presented for biological and conventional producers respectively:

Biological Producer	**Conventional Producer**
Average Age: 44.6 years	Average Age: 49.1 years
Comes from an Agricultural Family	
Occupied with farming by their way of life	Occupied with farming by family tradition
Member of a cooperative or a producer group	
Attended seminars Average schooling time: 13 years	Did not attend any seminars Average schooling time: 9 years
Their main occupation is farming	

B) Comparative analysis of viticultural farms under organic and conventional management

The comparative economical analysis of organic and conventional viticulture reveals that the average organically managed viticulture farm reaches gross income lower by 12% compared to the average conventionally managed one (Table 1).

In fact, despite higher producer prices achieved by organic farmers (26%) and the extra financial support received, organic viticulturists fail to reach higher gross incomes when compared to conventional ones, due mainly to lower yields (36%). It is worth noting that in the absence of subsidy, gross income generated in organic viticulture farms would be behind that of conventional ones by 19.3%.

As far as production costs are concerned, organic vineyard cultivation requires higher (by 12%) production costs than conventional production.

More precisely, total labor costs in the case of organic farms are higher by 32.3% than those of conventional farms (1,299.0 ˆ/hectare). This disparity is mainly due to the increased need for family (30.23%) and hired (34.47%) labor in biological viticulture. It should be noted that family labor costs in both organically and conventionally managed farms account for the majority of labor costs, reaching 24.6% and 21.2% respectively of total production costs (Table 1).

On the contrary, capital costs in organic are lower than the ones in conventional farms by 2.0%. Despite certification costs, which only organic farms are subjected to (143.0 ˆ/hectare) and higher constant and variable capital interests (4.0% and 6.8% respectively), biological producers have lower (by 38.0%) variable costs. This is also the reason why they manage to ensure lower (even by a small difference) total capital costs (Table 1).

Land costs do not significantly affect total production costs of either organic or conventional farms; however organic farms land costs are lower by 3.8% compared to those of conventional ones.

All individual organic farm economic results, although in the black, are highly divergent from the re-

Table 1
Gross annuity, production costs and economic results for average viticultural farms under organic and conventional management

	Biological farm	Conventional farm
I. Gross Annuity		
1. Yield, kg/ha	8576.0	13393.0
2. Price, €/kg	0,462	0,3666
3. Production value, €/ha (1 x 2)	3962.1	4909.9
4. Subsidy, €/ha	355.0	-
Total (3+4)	4317.1	4909.9
II. Production costs, €/ha		
1. Land	164.70	171.30
- Imputed rent	159.30	161.40
- Actual rent	5.40	9.80
2. Labour	1718.90	1299.10
- Family labour	865.40	664.50
- Hired labour	853.50	634.70
3. Capital	1627.50	1660.40
- Consumed (fertilizers, pesticides, etc.)	235.20	379.50
- Constant capital depreciation, maintenance and insurance premiums	1027.60	1069.50
- Constant capital interest	156.00	150.00
- Variable capital interest	65.60	61.40
- Certification costs	143.00	
Total (1+2+3)	3511.1	3130.8
III. Economic results, €/ha		
- Net profit	806.0	1779.1
- Gross profit	3080.0	3886.0
- Farm income	2912.0	3456.0

Source: Research data

spective ones of conventional farms (Table 1). This is due to the lower gross annuity attained and the higher costs incurred in vineyard biocultivation as compared to conventional viticulture (Table 1).

More specifically, farms in organic viticulture reach net profits lower by 54.70% than conventional ones. In the hypothetical absence of subsidy, conventional farms make net profits 3.8 times as much as that of biological producers.

Furthermore, organic farm gross profits and farm income are in turn estimated to be at lower percentages than those reached by conventional farms respectively (Table 1).

Conclusions

The rapid growth of biological agriculture, on a European as well as on an international scale, recently, has led to the increasing need for extensive study of this alternative production system, not only from an environmental, economic and social point of view, but also with regard to motivation.

Research results indicate that there is a significant differentiation between biological and conventional viticulturists, with respect to social characteristics as well as motivation, i.e. incentives-determinant factors affecting their decision to enter this sustainable production system. The above results corroborate those of previous studies which conclude that biological producers are younger in age, of higher educational standards, better informed and with less agricultural experience than conventional farmers, while their incentives for entering biological agriculture are mainly environmental and financial.

Comparative economical analysis of the average organically and conventionally managed farms suggests that the average viticulture farm under organic management incurs increased labor costs, slightly decreased capital costs while reaching lower yields in comparison to the average conventional viticulture farm.

The increased production costs and the decreased gross annuity related with the organic vine cultivation causes all individual economic results of organic viticulture to be remarkably lower compared to farms under conventional management. It is worth noting that organic viticulture farms' net profit was estimated to be lower by 55.0% than that of conventional viticulture farms.

Therefore, organic farming, though profitable, cannot compete with conventional farming as far as profitability is concerned, as yet. In the hypothetical absence of subsidy contribution to biocultivators' gross annuity, the difference in profitability rates grows further, to make conventional farms' profitability 3.8 times greater than that of organic ones. The principal cause of organic cultivation lagging in terms of profitability lies in the lower yields and higher labour costs in comparison to conventional farming.

It becomes obvious that under the existing agricultural practices regime, subsidy contribution is a critical factor in supporting, if not preserving biological viticulture. Nevertheless, biological viticulture can be considered economically viable and thus can ensure not only producer profitability, but also sustainable social, environmental and economic welfare.

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