

GEOGRAPHICAL BASIS FOR DEVELOPMENT OF ORGANIC OLIVE GROW IN CROATIA

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Conventional agriculture is among the biggest polluters of the environment. Overuse of synthetic pesticides, herbicides and mineral fertilisers have caused soil exhaustion, erosion, unbalance in the ecosystem, and their harmful effect on human health has been proven. This is why the author tried to point to the importance of development of organic agriculture, and olive growing as a traditional agricultural sector in coastal Croatia.

The main intention is to show the basic geographical aspects of coastal Croatia and to explain the ways it can influence the development of organic olive farming. It is specially emphasized that organically produced food must be incorporated in Croatian tourist offer. It will stimulate a bigger interest for Croatia as an attractive tourist destination in the world tourist market and will simplify the sale of organically produced food.

Development of organic olive farming will also contribute to the revitalisation of small villages where a strong presence of negative processes, such as deagrarisation, deruralisation and demographic regression is evident.

Key words: Organic olive farming, geographical aspects, deagrarisation, deruralisation, demographic regression

Konvencionalna poljoprivreda danas spada među najveće onečišćivače okoliša. Prekomjerna upotreba sintetičkih pesticida, herbicida i mineralnih gnojiva uzrokovala je iscrpljenost tla, pojačanu eroziju, neravnotežu u eko-sustavu, a znanstveno je dokazan njihov štetni učinak na ljudsko zdravlje. Stoga autorica nastoji ukazati na važnost razvoja ekološke poljoprivrede, a u sklopu nje i maslinarstva kao tradicionalne djelatnosti na području Hrvatskog primorja.

Glavni cilj bio je prikazati osnovna geografska obilježja ovog dijela Hrvatske i pokazati na koji način ona mogu utjecati na razvoj ekološkog maslinarstva. Posebno je istaknuta činjenica da se ekološki proizvedena hrana mora uključiti u hrvatsku turističku ponudu što će na svjetskom turističkom tržištu pridonijeti većem interesu za Hrvatsku kao atraktivnu turističku destinaciju i olakšati plasman ekološki proizvedene hrane na tržište. Razvoj ekološkog maslinarstva pridonijet će i oživljavanju manjih ruralnih prostora kod kojih su već duže vrijeme prisutni snažni procesi deagrarijacije, deruralizacije i demografske regresije.

Ključne riječi: Ekološko maslinarstvo, turizam, geografska obilježja, deagrarijacija, deruralizacija, demografska regresija

Introduction

Due to favourable natural and geographical conditions, olive production in Croatia has a long tradition. During the period of about the last six centuries, it has

developed into one of the most important economic sectors of coastal Croatia. It is considered that the first cultivated olive trees were brought to the East Adriatic coast in the 4th century BC, by the Greeks (ŠKARICA ET AL., 1996). Since the olives adjusted to the natural, especially climatic, conditions, they were planted on the other islands and on the part of shore with same natural characteristics.

Speaking of the historical development of olive cultivation, it is necessary to explain its importance for the islands that were, for practical purposes, isolated from the shore until the second half of the 20th century. On a great number of Croatian islands, mostly those situated in the Middle or South Adriatic, during the summer there is a long period characterised by little or no rainfall. In addition, those islands are mostly composed of calcium-carbonate and dolomite, which is the main reason why there are no surface flows and all the water that comes from the rain goes into the subsoil.

Since olive is a cultivar that does not demand a great quantity of humidity and is perfectly adjusted to the natural conditions of the coastal part of Croatia, people from the islands accepted it as the only, essential, source of fat.

Besides on the islands, olives were introduced in other parts of coastal Croatia, wherever natural conditions (primarily climate) allowed their cultivation.

Starting from the second half of the 20th century interest for olive cultivation in Croatia declined each year. In order to illustrate this information, it is enough to say that in Croatia, on the surface of the 15 000 ha of olives, there are around 3,5 million trees, but only 1 million of them are intensively cultivated (STATISTICAL YEARBOOK OF THE REPUBLIC OF CROATIA, 2001.). That is the reason why Croatia imports olives and olive oil from other Mediterranean countries: Italy, Spain and Greece. The small quantity of olive oil produced in Croatia, thanks to its excellent quality, commands a relatively high price on the market.

Since olive products are very wanted at the world market, olive cultivation could become very important economic sector. With larger financial investments, provided by the government, producers from Istria, Kvarner and Dalmatia would be motivated to intensify olive production and reanimate old olive trees. Some regions have already started the action of donating young olive trees to producers who are interested in intensifying production.

In the last decade organic agriculture started to develop more intensively in all parts of the world, especially in the countries of the EU and the USA. In the countries that are among the biggest producers of olive oil, Italy, Spain and Greece, organic cultivation of olives is already recognised as a new, financially profitable way of production. Another important reason, besides economic profitability, why olive production should be intensified is an easy adjustment of olives to organic cultivation, without any complex innovation.

The law governing organic agriculture in Croatia was introduced one year ago, but the regulations that determine certification for organic production have not been completed yet. In Croatia there is a certain number of organic producers who have foreign certification, but none of them are producing olives. Despite that, there is a small number of olive producers who produce organic olive oil. They can be divided in two groups:

In the first group there are those who know more about principles of organic agriculture and during the olive production they comply with all legally determined ecological standards. Those producers want to intensify organic olive oil production. That will be possible after they obtain the new Croatian certificates. During production they do

not use any synthetic pesticides, herbicides, artificial fertilisers or anything that can negatively influence the ecological-system or public health. Those producers are hoping to secure certification and a place among organic producers to prove the quality of their products;

In the second group, there are producers who grow olives in a traditional way, and they have never used pesticides, herbicides or artificial fertilisers. They do not produce olives intensively but only in small quantities for their own needs. They will probably never become serious producers of organic olive oil but they must be mentioned because of their contribution in preserving nature.

Main reasons for transfer from conventional to organic olive cultivation

During the 20th century, excessive use of different synthetic pesticides, herbicides and fertilising agents led to an imbalance in natural eco-systems, soil exhaustion, erosion and diminution of plants resistant to different species of parasites (BAŠIĆ, I., 2000). All these factors have a negative influence on human health. That's why it is necessary to show the importance of the development of all sectors of organic agriculture, including olive cultivation.

The bigger problem that generally regards Croatian agriculture producers is insufficient knowledge about the harmful influence of synthetic pesticides and herbicides on human health, as well as the great number of olive producers. For years, many of them, wishing to produce more olive oil, preventively treated olive trees against parasites, while other more ecological methods existed. They regularly used herbicides to easily destroy weeds, but very often they did not follow the instructions for use. All that negatively influenced the quality and natural healthiness of the olive oil.

Tab. 1. Average production of conventional and organic olives and olive oil in Spain, Italy, Greece and Portugal from 1997 to 2000

Tab. 1. Prosječna proizvodnja konvencionalno i ekološki uzgojenih maslina i maslinovog ulja u Španjolskoj, Italiji, Grčkoj i Portugalu od 1997 do 2000

STATES	Olives production (tones)	Olive trees (ha)	Organic olive trees (ha)	Organic olives production (tones)	Share of organic olive oil in total (%)
SPAIN	5.283,500	2.300,000	71.350	116.093	2,9
ITALY	2.975,000	1.139,000	88.645	218.145	7,0
GREECE	2.200,000	765.200	6.483	14.780	0,8
PORTUGAL	280.000	358.470	19.415	16.261	5,5
TOTAL	10.738,500	4.572,670	185.894	365.281	4,0

Source: <http://www.FAO.org> (28.03.2002.); <http://www.Mapya.es> (28.03.2002.); <http://www.biobank.it> (04.09.2002.)

Development of the organic olive production in the world can be followed from the 1990's, although there had been an initiative about this method of production much earlier. The most important organic olive oil producers at the moment are Italy and Spain

(Tab. 1). Out of all olive oil produced in Italy, 7% is organic, and in Spain about 2,9%. (Fig. 1). Although it seems that the share of organic oil is rather small, both countries have experienced rapid growth each year in the amount of land where producers practice organic agriculture.

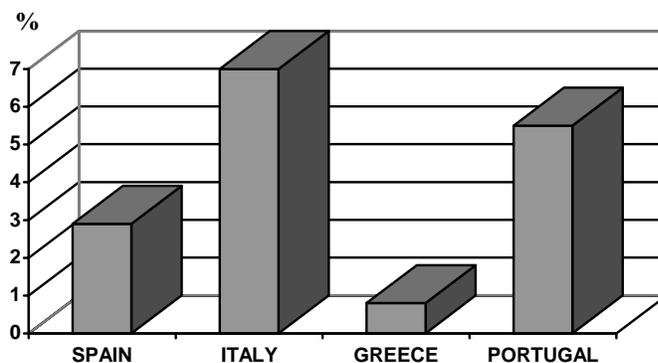


Fig. 1 Share of organic olive trees in total in Spain, Italy, Greece and Portugal

Sl. 1. Udio ekoloških maslinika u ukupnom u Španjolskoj, Italiji, Grčkoj i Portugalu

Speaking of development of organic olive cultivation in Croatia, one of the most important reasons for its further promotion, besides positive effects on human health, is the development of Croatia's most important economic sector – tourism.

On the world's tourist market it is not enough to offer only clean sea, pleasant climate and preserved nature because there are many other countries that can offer the same. But if Croatia includes organic, healthy food in the offer, interest for Croatia as a "small ecological country for a great holiday" will definitely increase, and it won't be necessary to search for a market to sell organic food since it will be marketed directly to the consumers.

Besides, Croatia is among those countries in the world that managed to preserve nature and extraordinary clean water. Since conventional agriculture is one of the greatest polluters, because it negatively influences all three elements necessary for human life: soil, water and air, we must work on the development of organic agriculture, which is still not promoted in Croatia in an appropriate way.

Influence of geographical position on the development of organic olive production

Olive oil has always been wanted on the world market because of its healthy characteristics; according to some scientists it even has anti-cancer effect (VIOLA, DAVOLI, 1996). But the problem is that olives don't grow in all climate areas in the world, but only in the areas with relatively warm and rainy climate. Because it is situated on the Adriatic Sea, Croatia is partly a Mediterranean country. That is why in the area of coastal Croatia the climate conditions are perfect for development of olive cultivation.

The position of Croatia between the West and Middle European countries on one side and the Southeast European countries on the other side is perfect because on their markets olive oil (conventional and organic) is very appreciated, which can influence the easier sale of the product.

Thanks to the fact that countries of Middle and South Europe, that generate a large number of tourists are near Croatia, a great number of their citizens come here on holiday every year. That is the reason why it is necessary to include organic food in the tourist offer to increase its quality, and to positively affect the satisfaction of the guests.

Effect of the climate on the development of organic olive production

Olive is a culture limited only to the areas of C or relatively warm, rainy climate (according to Köppen's climate classification). It is mostly spread in the areas of Csa climatic class or Mediterranean climate also called "the climate of olive", and in areas of Cfa or relatively warm, wet climate with hot summer. In Croatia, type of Cfa climate is spread in the part of Istria characterised by small relief, Kvarner with islands Losinj, Cres, Krk, Rab and Pag, and in the continental part of Middle Dalmatia where the quantity of rain is more or less equally distributed during the year (ŠEGOTA, 1996). In those areas a long summer dry season is not present. It is specific for the areas with Csa climate. This type of climate can be found in the coastal part of Dalmatia, south of the island Losinj and west of the island Pag (Fig. 2).

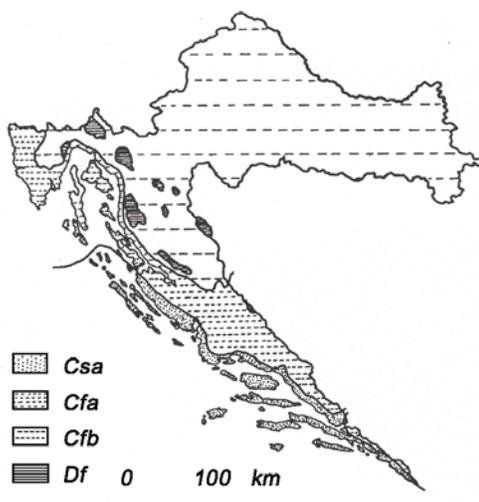


Fig. 2 Climate regionalization of Croatia (according to Köppen, modified after ŠEGOTA, 1996.)

Sl. 2. Klimatska regionalizacija Hrvatske (prema Köppenu, izmjenjeno prema ŠEGOTA, 1996.)

Average monthly temperature in the summer period in those regions is between 22 °C and 26 °C and decreases from SE to NW. Average winter temperature is between 5 °C and 9 °C and also decreases from SE to NW (METEOROLOGICAL AND HYDROLOGICAL

SERVICE OF THE REPUBLIC OF CROATIA, 2002.). Extremely cold winters that could adversely affect olive growth are very rare in those climate areas.

Average annual quantity of rain in the coastal part of Croatia is between 500 and 1200 mm, but it is not equally distributed during the year. The main low-pressure systems that come from the Atlantic Ocean and bring large quantities of rain circulate over Croatia in autumn and spring. That is why these seasons register the largest quantity of rain in coastal Croatia. The biggest problem, predominantly in southern coastal Croatia, is the small quantity of rain during the summer. Consequently, the arid period in Dalmatia sometimes lasts for more than four months (from mid-April to mid-August).

Although the olive is a plant that can survive despite dry summer, if we compare statistical data about olive production and rain quantity in Croatia from 1982 to 1996, shown in the figure 3, it is evident that the olive crop decreased in drier years, and increased in the years when more rain was experienced. In some years a variation is noted so that the quantity of produced olives increased despite a drier year. The main reason for that was the large quantity of rain during the previous spring and the smaller share of parasites, which can also be an important factor that influences the crop. It is very important to say that olive trees are characterised by high productivity one year and less productivity another year. It cyclically repeats in all of its productive lifetime. Nevertheless, with appropriate olive cultivation more balanced production can be accomplished.

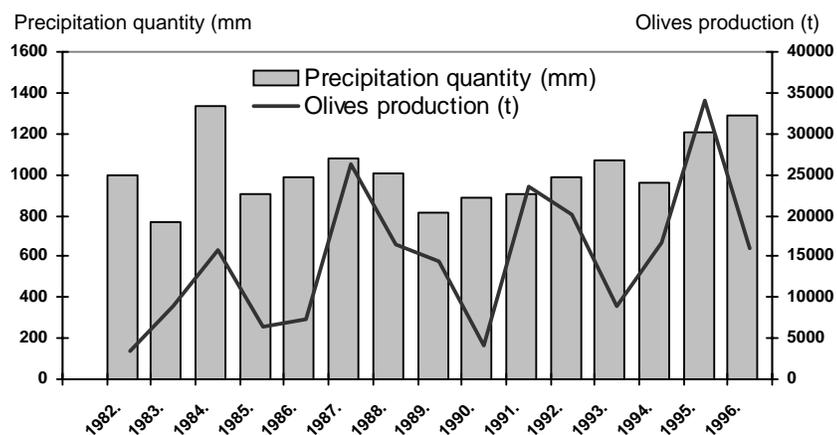


Fig. 3 Relation between average precipitation (in mm) measured in meteorological stations: Rovinj, Rijeka, Crikvenica, Senj, Šibenik and Split Marjan, and total olive production in tones from 1982. to 1996. in Croatia

Sl. 3 Odnos između prosječne količine padalina (u mm) izmjerene u meteorološkim postajama: Rovinj, Rijeka, Crikvenica, Senj, Šibenik i Split Marjan, i ukupne količine maslina (u t) proizvedenih od 1982. do 1996. u Hrvatskoj

Since higher humidity can ensure a bigger crop, irrigation systems, which are still insufficiently used, should be introduced in olive farming. There are two main reasons for their present nonutilization:

- olive farming is mostly organised on the small pieces of land where it is financially unprofitable to bring in expensive irrigation systems;
- a great part of olive fields are on the islands where there is not enough water for fundamental life needs of the local people let alone for irrigation of any crop. It is known that olive cultivation had been developed so early on the Croatian islands precisely because olives can survive long, dry summer period.

In organic olive farming much more attention is given to land cultivation, pruning and fertilising which provides, among other things, the bigger resistance of the plants to different kinds of parasites, diseases and, partly, bad climate conditions. To decrease the negative effect of dryness in the areas where there are no irrigation systems, olives must be regularly pruned every year (like vineyards), but many olive growers do not practice that. If autumn and winter seasons are drier, much more younger branches than usual must be cut during tree pruning. Otherwise, if there are many olives on the tree during the spring, and the summer is too dry, a large quantity of young olives will probably fall off the tree. In olive cultivation, during the summer period it is important to cultivate the land in order to destroy larger weeds and to preserve more humidity that the olive trees need.

Soil enrichment with minerals and organic material in organic olive growing

On the great part of coastal Croatia, because of its karst structure, there are different types of brown and red soil or "terra rossa". These soils are relatively poor with organic material and minerals (MARTINOVIĆ, J., 2000). In conventional agriculture, including olive growing, agrarians tried to compensate it with use of artificial fertilisers. In this way they were bringing to the soil a large amount of minerals without previous control. On the other side, more erosion is experienced and the soil is impoverished with organic materials, which are the main reasons for transferring from conventional to organic production. Soil impoverishment led to decrease in plant resistance to different types of parasites and illnesses, not only of olives but also of other crops, which automatically resulted in decreased crop quantity.

Appropriate plant nutrition is very important in agriculture for accomplishing maximum production. There are a few different ways to obtain soil enrichment in organic agriculture, and all of them are applicable in the olive growing.

The use of Californian worm humus must be mentioned as one of the most important ways of soil enrichment. Among other things, in humus there is a large amount of different minerals like P, N and K that used to be brought into the soil by the use of artificial fertilisers. Natural fertilisers (like animal manure) can also be used for soil enrichment, but the share of organic matter, nitrogen, phosphates and potassium is smaller in these fertilisers than in Californian worm humus (DUGONJIĆ, 2000).

Animal manure can be problematic because it contains different kinds of pathogenic organisms which, brought into soil, can negatively influence the crop growth, unlike the use of compost or Californian worm humus.

By using Californian worm humus crops can be increased, although it also depends on other elements, primarily enough humidity. In this way, faster fruit maturation can also be accomplished (DUGONJIĆ, 2000). This can be very important in fruit and vegetable growing because it can provide higher price on the market.

In organic olive farming, minerals are brought into the soil also by the use of different kind of mineral flours, which can ionise some other chemical elements, such as nitrogen. They can be a great protection against soil erosion.

There are also some other methods used for improving soil quantity: green fertilising (production of the green mass, rich of organic matter) and mulching (humus production by putting organic matter under olive trees; though this humus has a lower quality than Californian worm humus).

Effect of the development of organic olive growing on processes of deagrarianisation and deruralisation

Until the second half of the 20th century Croatia was a typical agrarian country, because of the large proportion of the agrarian population. After World War II, the strong presence of industrialisation in Croatia can be noticed, which finally led to deagrarianisation and deruralisation. A great percent of inhabitants from rural zones emigrated to larger urban centres, which caused the "dying" out of the villages in some areas (Tab. 2, Fig. 4). Although those processes were present in all parts of Croatia, their most negative influence was noticed in the settlements on the islands located farther from mainland (because the communication with the mainland was not regular as it is today), and also in the settlements in the mountainous part of Croatia.

Tab. 2 Total number of inhabitants and number of agrarian population from 1931 to 1991 in Croatia

Tab. 2. Kretanje ukupnog broja stanovnika i broja poljoprivrednih stanovnika od 1931. do 1991. godine u Hrvatskoj

	NUMBER OF INHABITANTS	AGRARIAN POPULATION	AGRARIAN POPULATION (IN TOTAL)	BASE INDEX OF REDUCTION OF AGR. POPUL.	CHAIN INDEX OF REDUCTION OF AGR. POPUL.
1931.	3.785,271	2.634,008	69,6 %	100 %	100%
1953.	3.936,022	2.209,716	56,1 %	83,9 %	83,9%
1961.	4.159,696	1.824,819	43,9 %	69,2 %	82,5%
1971.	4.462,221	1.338,267	30,2 %	50,8 %	73,0%
1981.	4.601,469	667.696	14,5 %	25,3 %	49,0%
1991.	4.783,265	409.647	9,1 %	15,5 %	61,3%
2001.	4.437,460	245.987	5,5 %	9,3 %	60,0%

Source: Croatian Bureau of Statistics, Zagreb 2002.

Since olive farming was developed mostly on the islands, it is obvious that the process of deagrarianisation also negatively influenced this agrarian sector. The encouragement and development of organic olive farming can lead not only to diminution of those negative processes but also to the revitalisation of some rural zones, today inhabited only by older people, physically unable for agrarian valorisation.

Agrarian population (in 000)

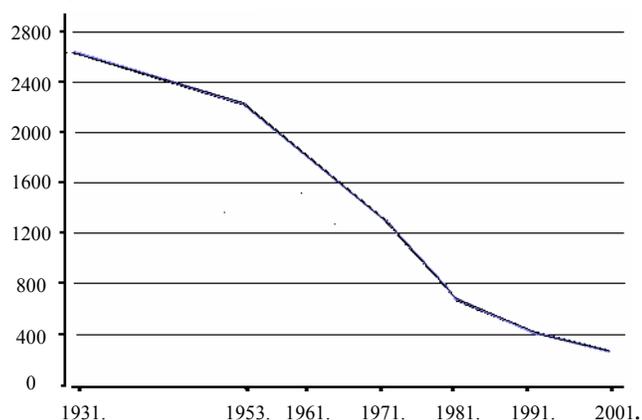


Fig. 4 Agrarian population in Croatia from 1931 to 2001

Sl. 4. Kretanje broja poljoprivrednih stanovnika u Hrvatskoj od 1931. do 2001. godine

Since olive farming was developed mostly on the islands, it is obvious that the process of deagrarianisation also negatively influenced this agrarian sector. The encouragement and development of organic olive farming can lead not only to diminution of those negative processes but also to the revitalisation of some rural zones, today inhabited only by older people, physically unable for agrarian valorisation.

Development of organic agriculture is extremely important for further development of Croatian tourism. Rural tourism is attractive to those guests who come from big urban centres and by the word "relax" they mean "spending time in a small village, encircled with fresh air, preserved nature and organically produced food". Small, barely inhabited, settlements on Croatian islands are offering precisely that kind of atmosphere. With the development of rural eco-tourism we can contribute to diminution of deruralisation, revitalisation of island's economy, protection of Mediterranean crops growing tradition (olives, grapes, figs, almonds, carobs) and, the most important thing, to nature preserving.

Conclusion

For many years people have been acting as if they have the right to manage all natural resources in the way they want to. That has caused the extermination of many animal and plant species and also provoked disturbances in the ecosystem. One way of recovering negative human influence on nature is stronger development of organic agriculture. Unfortunately, the number of those who know about the principles of this kind of food production is still small. On the other hand, there is large number of those who are suspicious about the financial worth of organic food production.

Croatia is one of the counties where organic agriculture still has not been recognised as a worthwhile way of producing "healthy food". The share of organic farms is

still insignificant, although a bigger interest for the transfer from conventional to organic production has been noticed. By the end of 2002 control stations should be established and Croatian certificates finally given to those agrarians who have already prepared their farms for organic production.

Within organic agriculture, development of organic olive farming should also be worked on, because thanks to favourable natural-geographical and market conditions it will be more profitable than growing some other crops. This has already been proven in the countries that have a longer practice with organic olive and olive oil production.

It will also contribute to preservation of natural ecosystem that is endangered in the olive growing zones. It is enough to mention that years ago there were many kinds of aromatic, healthy herbs among olive trees. Today these herbs, like sage, are endangered by overuse of herbicides, which directly influences the development of some other agricultural sectors, such as bee farming.

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SAŽETAK

Anica Čuka: Geografska osnova razvoja ekološkog maslinarstva u Hrvatskoj

Zahvaljujući povoljnim prirodno-geografskim uvjetima maslinarstvo se na području Hrvatskog primorja do druge polovice 20. st. razvilo u jednu od važnijih poljodjelskih grana. Na otocima koji su stoljećima bili izolirani od kopna i na kojima su masline iznimno dobro uspijevale, maslinovo ulje se koristilo kao jedini, neophodni izvor masnoće.

No, u drugoj polovici 20. st., zbog jačanja industrije dolazi do pojave procesa deruralizacije i deagrarijacije što se, osim u nekim dijelovima kontinentalne Hrvatske, izrazito negativno odrazilo i na otoke. Pojedina otočka naselja, pogotovo ona smještena na otocima udaljenijim od kopna, danas su gotovo "izumrla", a zbog konstantnog smanjenja broja stanovnika sposobnih za obrađivanje maslinika, ova se djelatnost sve više zapušta. O tome dovoljno govori podatak da se u Hrvatskoj od 3,5 milijuna stabala maslina, obrađuje svega 1 milijun, dok su ostala stabla zapuštena.

Posljednjih godina u svijetu je došlo do jačeg razvoja ekološkog maslinarstva. S obzirom da je maslina kultura koja se, u odnosu na druge, lako prilagođava ekološkoj proizvodnji, a ne zahtjeva znatne inovacije, u zemljama koje spadaju među najveće proizvođače maslinovog ulja, a tu možemo svrstati prvenstveno Italiju, Španjolsku i Grčku ekološko maslinarstvo prepoznato je kao nov, isplativ oblik proizvodnje. Ovako proizvedeno ulje na tržištu postiže znatno veću cijenu, a traženo je zbog ljekovitih, prema nekim istraživanjima, i antikancerogenih svojstava.

Kad je u pitanju razvoj ekološkog maslinarstva u Hrvatskoj, jedan od najvažnijih razloga njegovog daljnjeg promicanja, osim povoljnog djelovanja na ljudsko zdravlje, jest razvoj turizma kao jedne od najvažnijih hrvatskih gospodarskih grana. Na svjetskom turističkom tržištu više nije dovoljno ponuditi samo čisto more, ugodnu klimu i lijep okoliš jer postoji još mnogo drugih, svjetski poznatih, turističkih zemalja koje u svojim ponudama nude isto. Uključenjem ekološki proizvedene hrane u hrvatsku turističku ponudu pridonijet će se većem interesu za Hrvatsku kao atraktivnu turističku destinaciju i olakšati plasman ekoloških proizvoda na tržište.