# The relationship between the market and cultivation in Europe from the point of view of organic farming

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***Abstract:*** *Our first thought may be that where the production side of organic farming has a strong background, there are also strong markets. However, if we look deeper into the issue, we can see that this is only true in some countries, but rather there is a link between environmental awareness, prosperity and organic products, and between the production of organic goods and the development of agricultural and processing industries. The study analyzes these issues and substantiates the claims, based on data from recent decades.*
***Keywords:*** *organic farming, cultivation, consumption, regression*

## 1 Introduction

The aim of this study is to examine the relationship between agricultural production areas and the size of food markets in the point of view organic farming in Europe. As Buday-Sántha wrote in 2011 (Buday-Sántha, 2011), developed countries cannot afford it, while underdeveloped countries cannot afford not to provide their basic food supply. While the more developed industrialized states with a significant service sector supply themselves with staple foods for strategic, independence reasons, the poorer states have a lifeline to have food that is often not realized. Developed states, if they do not supply themselves with these, become vulnerable to their malice. They have the opportunity to starve them. If we ask the question why the castle of Sümeg did not fall and why Montsegur was able to fall, the background to the answer is logistical. While the defenders of the castle were secretly supplied from the settlement of Sümeg through the secret tunnel system, the fortress of Montsegur on a very similar mountain peak, did not have such an opportunity, and the defenders of the castle were starved for 3 weeks.

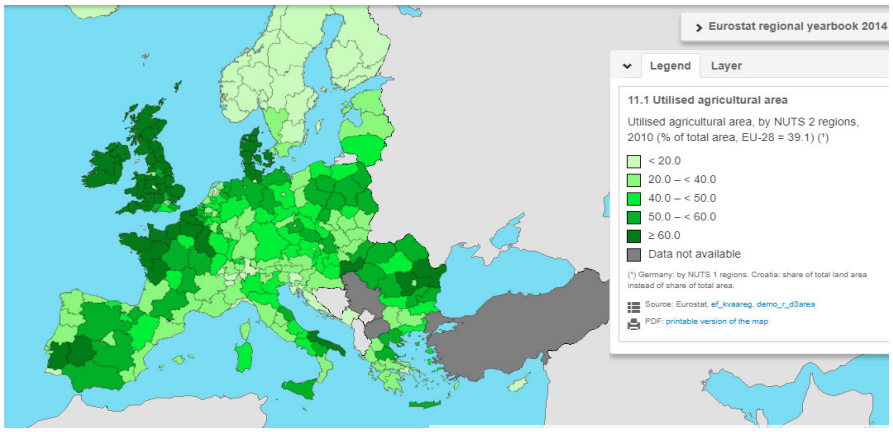


Figure 1

Utilized agricultural area Source: EU own edition

Regions with significantly high cultivation rates are either traditionally agricultural areas with favorable conditions or non-poor quality areas with high mechanization opportunities. More developed states take advantage of their stronger industries to bring capital to agriculture, which can increase its efficiency, resulting in higher yields and more efficient production.

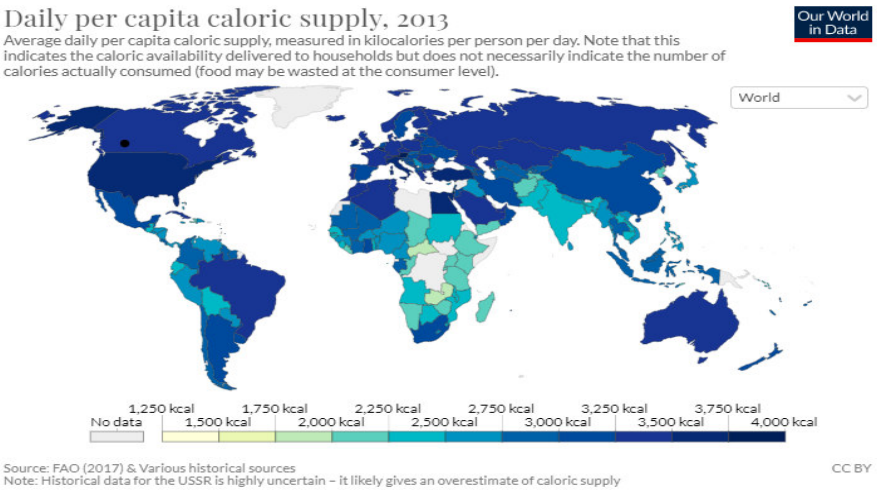


Figure 2

Daily per capita caloric supply Source: ourworld in data organistaion own edition

Organic production is a renewed mode of production that was renewed by Rudolf Steiner in the 1920s. What were the reasons for its appearance? The national economies, which wanted to supply an increasingly industrialized and growing

population, followed the industrial model, ie industrial agriculture appeared. Due to the increase in production, a larger amount of fertilizer was used, and chemical materials and pesticides were used to protect the crop. Mechanization appeared, which was able to cultivate larger and larger areas with greater efficiency. It was characteristic that with the mechanization of one operation, for example: harvesting, threshing, plowing) the labor force was freed up, ie the work of the multitude of animals that were traction and the people doing the work became redundant.

From subsistence agriculture, a system of market production emerged and with it the disintegration of closed agriculture, one of the advantages of which was that it was sustainable, despite the fact that its production systems were a fraction of its efficiency. The commodity-like agricultural model, which relies heavily on external, industrial resources, has emerged. This change of model made a significant part of the agricultural workers redundant, and it also resulted in the disintegration of village communities, which were characterized by a close working relationship. The closed connection between the village, the individual and the land was broken. I'm not even talking about the fact that this detachment from nature has triggered processes that have resulted in urbanization, unnatural lifestyles and rhythms, and the generalization of stress to a greater extent. With the decrease in the proportion of rural people and the decrease in the number of producers, the land no longer represented the base of the village and the individual. As a result, Steiner developed a farming model that runs counter to the visible direction of development, especially in the village and it relies on the internal resources of the agricultural sector and continues to preserve the close-to-nature, closed system of agriculture from the ground, and thus the rural community and way of life. One of Steiner's main goals was also to reverse the devastation caused by industrial production, and he wanted not only conservation measures but also a system to improve the state of the environment. Following Steiner, several organic production trends have developed on similar principles, but overall, organic production has played a marginal role in agricultural production for decades. This changed when the harmful effects of chemical use became known in the 1960s. In parallel, due to the oil explosion in the 1970s, the cost of industrial production increased significantly. Meanwhile, agricultural commodity prices have fallen significantly due to market oversupply. Agriculture has thus sought new ways to meet environmental and economic requirements.

In the 1990s, uniform rules for organic production were born in the USA and the European Union, but also worldwide, where individual producer and trade associations may impose stricter conditions (eg BioSuisse in Switzerland or Demeter in Germany). , but products produced on looser terms are gradually being pushed out of the market. The unification of standards and the growth of trade in organic products, the financial support of producers make it possible and necessary for continuous professional control and statistical registration of organic production. This has created the opportunity for more and more information on

organic farming, both domestically and internationally, and for science-based research.

**Organic Agriculture: Key Indicators and Top Countries**

| Indicator | World | Top countries |
|---|---|---|
| Countries with organic activities[1] | 2018: 186 countries | |
| Organic agricultural land | 2018: 71.5 million hectares (1999: 11 million hectares) | Australia (35.7 million hectares)<br>Argentina (3.6 million hectares)<br>China (3.1 million hectares) |
| Organic share of total agricultural land | 2018: 1.5 % | Liechtenstein (38.5 %)<br>Samoa (34.5 %)<br>Austria (24.7 %) |
| Wild collection and further non-agricultural areas | 2018: 35.7 million hectares (1999: 4.1 million hectares) | Finland (11.3 million hectares)<br>Zambia (3.2 million hectares)<br>Tanzania (2.4 million hectares) |
| Producers | 2018: 2.8 million producers (1999: 200'000 producers) | India (1'149'371)<br>Uganda (210'352)<br>Ethiopia (203'602) |
| Organic market[2] | 2018: 96.7 billion euros (2000: 15.1 billion euros) | US (40.6 billion euros)<br>Germany (10.9 billion euros)<br>France (9.1 billion euros) |
| Per capita consumption | 2018: 12.8 euros | Switzerland (312 euros)<br>Denmark (312 euros)<br>Sweden (231 euros) |
| Number of countries with organic regulations | 2018: 103 countries | |
| Number of affiliates of IFOAM – Organics International | 2018: 779 affiliates from 110 countries | Germany - 79 affiliates<br>India - 55 affiliates<br>China - 45 affiliates<br>United States - 48 affiliates |

Figure 3

Organic agriculture's key indicators Source: FiBl 2020.

In Europe there was 15.6 million hectares of organic agricultural land in 2018 of which EU territory was 13.8 million hectares. The number of producers was 418.000 of which in EU the number is 327.000. The ratio of organic farming is significant. In gereneral 3.1 percent of all agricultural territory was organic while in the EU the ratio was 7.7 percent. The territory of organic farms increased by over 1.25 million hectares compared to 2017. Spain had the largest organic area in Europe with 2.2 million hectares, second is France with 2.0 million hectares and Italy, with 2.0 million hectares. We can see 10 countries with minimum 10 percent organic farmland ratio. Liechtenstein, (38.5 %), Austria (24.7 percent), Estonia 21.5 percent. One of the most important factor is the market. It is necessary to sell the product to the customers. Retail sales of organic products was 40.7 billion euros in 2018, while 37.4 billion in EU. It means 7.8 percent since 2017. Germany has the largest market with 10.9 billion euro retail sales, followed by France with 9.1 billion.

## 2 Methods

If the role of both the cause (s) and the cause is mediated by quantitative criteria, we speak of a correlation relationship. Hereinafter, it is primarily a factor or explanatory we present the measurement of the relationship between a variable (X) and a result variable (Y). However, when measuring the correlation relationship, it is relatively easy to examine the combined effect of several causes. According to the nature of the correlation, the following relationships can be interpreted between the variables: monotonic relationship and within this linear relationship. The most common indicator for measuring the correlation relationship is the linear correlation coefficient (sign: r), the application of which assumes a linear relationship between the variables, or if the assumption of linearity is not far from the problem under study. The correlation coefficient is calculated using the covariance measure characterizing the co-movement of the variables and the standard deviation of the variables.

In addition to correlation calculation, regression calculation is the most commonly used statistical method for examining the relationships between quantitative criteria. Regression calculation examines the tendencies of phenomena, trying to grasp the nature of the relationship in the form of some well-understood and interpretable function. These functions are called regression functions.

In practice, the role of the factor variable parameter (b1) is particularly prominent, the statistics call it a regression coefficient, while the parameter b0 is called an axis section or constant. The regression coefficient quantifies the expected change in the outcome variable accompanying the unit increase of the factor variable in the originally given unit of measure, ie a unit change in the value of the explanatory variable changes the result variable by b1 units. Knowledge of the regression coefficient allows us to quantify the elasticity (flexibility) even in the case of a linear relationship, which expresses the relative (expressed as a percentage) degree of change. The indicator provides an answer to the percentage change in outcome variable Y that is expected to contribute to a 1% change in explanatory variable X. (Pintér-Rappai 2007, Ács 2014)

## 3 Results

We first examine the data of the correlation matrix, which illustrates the direction and tightness of the correlation between the examined variables in pairs. Examined by country, the following results are obtained. For most countries, all variables are closely related, ie each variable has a close, positive relationship in pairs. However, there are countries where this is not the case, i.e., relationships are moderately or weakly related to each other in pairs. As a result, the correlation matrix calculated for the whole data set no longer provides as clear a picture as in most countries. In the summary table, we see a strong relationship between the size of the production area and the number of producers. The relationship between the area and the quantities sold on the market is medium. There is a weak

relationship between the other relationships in the aggregate. Which countries do not operate in a post-majority manner. Hungary, Finland, the Netherlands, Norway and Denmark. In these countries, the size of the area does not strongly determine the number of producers, the proportion of organic producers, and the value of goods sold in the markets.

Looking for the answer to the question of whether the volume of sales of organic products depends on the proportion of organic farming in a given country, or on the number of producers. Then, in countries where the available data are complete, I look for which is characterized by output and product purchases and where it is that production is dominated or just purchases. Data are available between 2000 and 2018. The figures for European countries are as follows. The size of organic farming in hectares, the ratio of organic farming to the total area under cultivation. The number of producers and the organic product sold in millions of euros.

Table 1 Regression data

| | R | Rsquare | Corrigated | Standard false | Events | Significatio |
|---|---|---|---|---|---|---|
| UK | 0,352 | 0,124 | 0,073 | 0,475 | 19 | 0,139 |
| Switzerland | 0,928 | 0,861 | 0,853 | 0,718 | 19 | 0,000 |
| Sweden | 0,891 | 0,794 | 0,782 | 2,296 | 19 | 0,000 |
| Spain | 0,959 | 0,920 | 0,916 | 0,793 | 19 | 0,000 |
| Slovenia | 0,822 | 0,676 | 0,657 | 1,491 | 19 | 0,000 |
| Poland | 0,803 | 0,645 | 0,624 | 0,989 | 19 | 0,000 |
| Norway | 0,469 | 0,220 | 0,174 | 0,895 | 19 | 0,043 |
| The Netherlands | 0,789 | 0,623 | 0,601 | 0,236 | 19 | 0,000 |
| Italy | 0,937 | 0,877 | 0,870 | 0,924 | 19 | 0,000 |
| Ireland | 0,912 | 0,832 | 0,822 | 0,179 | 19 | 0,000 |
| Hungary | 0,613 | 0,376 | 0,339 | 0,644 | 19 | 0,005 |
| Greece | 0,824 | 0,679 | 0,661 | 0,936 | 19 | 0,000 |
| Germany | 0,981 | 0,963 | 0,960 | 0,299 | 19 | 0,000 |
| France | 0,994 | 0,989 | 0,988 | 0,189 | 19 | 0,000 |
| Finland | 0,966 | 0,933 | 0,929 | 0,501 | 19 | 0,000 |
| Denmark | 0,820 | 0,672 | 0,653 | 0,671 | 19 | 0,000 |
| Czech | 0,935 | 0,874 | 0,866 | 1,044 | 19 | 0,000 |
| Belgium | 0,942 | 0,887 | 0,881 | 0,620 | 19 | 0,000 |
| Austria | 0,976 | 0,953 | 0,950 | 0,572 | 19 | 0,000 |

Source: FiBl 2020, own calculation.

If we look at countries where we didn't find strong correlation coefficients between factors in all cases. What may be behind this trait? In the case of the Netherlands, we see a strong link between the ratio of farmland and organic farming, but this is no longer the case in terms of the number of producers and market turnover. This may be due to the fact that, compared to production, Dutch consumers have higher demands, which are covered by imports, mainly from French, German and Austrian producers. We see a very similar situation in

Denmark. Strong agriculture, few switched producers, strong demand for organic products. The third example is our country. Producers of raw materials, with a relatively large area. Lower demand due to high ecological surcharges and rural consumers with lower purchasing power.

**Conclusions**

In most countries, there is a strong relationship between the size of organically farmed land and the value of organic products sold. That is, it is clear that countries with strong organic production have strong purchasing power. In the table, we do not find a country where weak production is associated with a weak market. In the countries with the exception, either purchasing power is weak and therefore a country with good conditions is forced to export, or purchasing power is so strong that production is not worth it. Denmark is a good example of this, where otherwise strong agricultural production has not switched to organic farming and therefore demand is met by imports. In the case of Finland, we see a weaker demand. There is no strong demand for organic products among the population. The situation is similar in Norway, while in the Netherlands, as in Denmark, we encounter stronger demand compared to production. Our country is an example of a country with good endowments, with raw material exports and minimal processed food, not providing adequate supply for consumers, because the products appear at very high prices compared to the demand.

**References**


[1] Ács, P.: Gyakorlati adatelemzés Pécs, 2014. Download: 2020.06.14. http://www.etk.pte.hu/protected/OktatasiAnyagok/%21Palyazati/GyakorlatiAdatelemzes.pdf

[2] Buday-Sántha Attila: Agrár- és vidékpolitika, Saldo, Budapest, 2011.

[3] Pintér J. – Rappai G. Statisztika I. PTE, Pécs. 2007

[4] Willer, Helga – Lernoud Julia (ed.): The world of organic agriculture, https://shop.fibl.org/chen/mwdownloads/download/link/id/1202/ Download: 2020.06.24.

[5] Eurostat (2020): Statistics Download: 2020.06.24.

[6] FiBl satistics: https://statistics.fibl.org/ Download: 2020.06.24.

[7] https://ourworldindata.org/food-supply Download: 2020.06.24.