FACTORS OF INCREASING OF ORGANIC FARMING ACCORDING TO DEMAND AND SUPPLY

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Introduction

The demand for healthy food has been intensifying up to the second half of the 20th century due to the negative externalities of industry-like production, which turned public attention to organic farming.

The demand for organic products is increasing, but the supply is low in comparison. Considerable extra profit can be realized on organic products, which inspires more and more farmers to convert their activity into organic farming. According to different surveys consumers tend to pay even 60-70% higher prices for organic products than for industry-like produced goods at the present time. Producing organic products is therefore an important opportunity to ensure the profitableness and - through that - the long-term subsistence of farms.

Organic farming in Hungary can be said to be still young, reliable territorial data are available only from the year 1995. The size of the inspected areas increased dynamically up to the first quarter of the 2000s, when this expansion broke [Roszik 2006]. The first phase of that growth showed an exponential trend. If we want to compare organic farming with product life cycle curve, then we can state that the process taken place is similar to the section of the curve showing dynamic increase and upgrade. According to the researches of Járási [2005] the regression S-curve (the logistic function) shows tight fit to the time series, the coefficient of correlation is 0.993.

In Hungary the number of inspected farms performed a dynamically growing tendency with smaller breaks in the second half of the 1990s. Despite of the fact that the number of farms even decreased somewhat in certain years, the extent of inspected areas increased, which resulted the growth of the average farm size. This growing trend lasted until 2003, after that the process turned. In 2004 both the number of the inspected farms and the size of the inspected area diminished. It is still unknown whether this break is temporary or it is the beginning of bursting of the "ecological-balloon". Similar break is experienced in the pace of growth in other member states of the European Union as well, in spite of the fact that organic production is subsidized even with political tools. [Járási 2005]

The purpose of the research is to analyse the effects of the changes of the factors affecting the market equilibrium: demand and supply on the growth tendency of organic farming, and to seek for economic explication for the growth phenomenon, can be experienced nowadays.

Material and methods

The research was leaned on the statistical data of Biokontroll Hungária Ltd., certifying organization of organic farming in Hungary. Logistical (autocatalitical) function, used for approaching the classical product life cycle curve, was applied for building models on the basis of the analysis of tendencies and of the results of the above-mentioned sources.

 DOI: 10.1556/CRC.35.2007.2.252

It was analysed with mathematical model how the conversion to organic farming affects the revenues realized by farms and how the added value changes on national level.
The assumptions of the model were the followings:

- Due to the growth of the number of those who convert their activity (i.e. due to the growth of supply) organic products become "mass-products", thence the solvency of marginal consumer determines market prices. The marginal price of organic products is the price of industry-like produced goods.
- The pace of the conversion of farms (the supply potential) can be characterized with logistical function (q(t)), which is:

$$q(t) = \frac{q_{max}}{1 + \frac{q_{max} - q_0}{q_0} \cdot e^{\frac{\ln\left(\frac{q_{max} - q_T}{q_{max} - q_0} \cdot \frac{q_0}{q_T}\right)}{T} \cdot t}}$$

  where: q_{max} is the theoretical maximum of supply (%); q_0 is the theoretical minimum of supply (%); q_T is supply at the point of time T (%); T is the examined time (year); t is time variable (year); e is the constant of natural logarithm.
- In case that the purchasing power (willingness to pay premium price) of the marginal consumer (consumer newly entering the market of bio-products) determines the price, it can be defined with diminishing price-function, but the degradation of extra profit intervenes delayed, and it happens contrarily to the conversion: it can be characterized by logistical function. The function of the willingness to pay premium prices of the marginal consumer (p(t)) is:

$$p(t) = p_{max} - \frac{p_{max}}{1 + \frac{p_0}{p_{max} - p_0} \cdot e^{\frac{\ln\left(\frac{p_{max} - p_0}{p_{max} - p_T} \cdot \frac{p_T}{p_0}\right)}{T} \cdot (t+\tau)}}$$

  where: p_{max} is the theoretical maximum of price surplus (%); p_0 is the theoretical minimum of price surplus (%); p_T is price surplus at the point of time T (%); T is the examined time (year); t is time variable (year); e is the constant of natural logarithm; τ is coefficient of delaying price diminution.
- The average revenue of bio-products differs from the industry-like production (it is typically lower). [Beke et al. 2006]
- The change of the surplus of production value is an adequate indicator for measuring the changes of producing revenue. The surplus of production value (SPV) is:
  $SPV = q(t, T, q_0(=t_0), q_{max}) \cdot \eta \cdot y_0 \cdot p(t, T, p_0(=t_0), p_{max}, \tau)$,
  where: q is the capacity of ecological fields (converted farms); y_0 is base-yield (average yield of industry-like production); T is the length of time to achieve a q_T=90% level of conversion (year); η is the coefficient of average diminution of revenue on the converted areas; p is price; τ shows the delaying of price diminution caused by the growth of supply (year).

Results and discussions

The market position, the price and the attainable premium of organic products depends on the equilibrium of demand and supply, and on the degree of the distance from the