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2.2. ANALYSIS OF THE HUNGARIAN MUSTARD SEED SECTOR

Summary

Nowadays the mustard seed production represents only 3000-4000 hectares in the total agricultural area in Hungary. The crop area of mustard seed has been decreased continuously in for the past 10 years, and this tendency are not going to change in the future. The Hungarian mustard seed production has both organizational and economic problems, which may worsen the problems and the hard situation of this sector. In my researches, I demonstrated and analyzed the market connections of the mustard seed producing sector, the differences in the bargaining power of the market players and I make suggestions to solve the organizational problems of the mustard seed production. I made economic calculations on the mustard seed production data, to determine the cost and income data of mustard seed production in Hungary, per hectare. The development and improvement of market connections is quite necessary in the mustard seed sector. On the base of the results of my calculations, I make proposals for the renewal of the mustard seed production and sales market, which may improve the domestic market situation and the willingness of the mustard seed producers.

Keywords: mustard seed, agricultural production, mustard seed market, input-yield relations

Introduction

Nowadays, the sustainability is among the most important questions all over the world. The threats of the environmental pollution have been taken into consideration not only by the producers and customers, but also by the EU policymakers. Both the Europe 2020 strategy and the new Common Agricultural policy highlighted the importance of the production of safe and good quality products in such way which minimize the harmful environmental effects and preserve or improve the present state of our environment. (Törő-Dunay, 2011)

The concept of sustainable plant production technologies emerged in the early 1990s in Hungary, simultaneously with the structural changes of the Hungarian agriculture. (Szakál and Illés, 1993) The new small-scale farm structure, the establishing of family farms has contributed to the introduction and the spread of the use of sustainable (traditional) technologies. (Illés and Podmaniczky, 1999) The sustainability became more important with the EU accession, and its importance is increasing at the present, and this process will be continued in the future.

Although mustard seed production has never been among the most significant plants of agricultural production, but it was considered as an important tool of sustainable production because of its role in rotation cycle and its positive effects on technology, plant protection and soil structure.

In the 1980s, Hungary produced the mustard seed in the largest area in Europe and globally it was the second largest exporter country in after Canada. The crop area of

mustard seed production in Hungary decreased continuously in the last years, which resulted a significant decline of the sowing area. In the 1990ies the cropping area of the mustard seed was nearly 35 000 hectares and Hungary's mustard seed export represented 10% share in the world market. Mustard seed, therefore, could be considered as one of the most important field crops in Hungary. In contrast with the former success, the average cropping area of 2010 and 2011 has decreased to only 4500 hectares, which justify the need for examination of the sector and the exploration of the reasons of this significant decrease.

The place of Hungary in the rank of the world's mustard seed production is shown in Table 1. The largest mustard seed producer of the world is India, but the statistical data of the country – as well as in Pakistan and Bangladesh – are related not only to mustard seed, but also rapeseed, therefore the database for these three countries cannot be evaluated officially.

According to the estimations of the Canadian Special Crops Association the production of India was 2,5 million tonnes while Pakistan and Bangladesh together produced 150 thousand tonnes in 2001. In the Asian countries, mustard seed is produced mainly for oil production. (Bi-Weekly Bulletin, 2001)

Apart from these countries, the world's mustard seed production is very concentrated. More than the half of the world production is represented by Canada and Nepal; the next most important producers are Ukraine and Mianmar. The production data between 2008 and 2012 are summarized in Table 1.

Table 1: The world's mustard seed production between 2008 and 2012 (1000 tonnes)

Country	2008	2009	2010	2011	2012
Canada	161	208	187	125	130
Nepal	134	135	149	139	139
Ukraine	39	118	64	50	56
Mianmar	66	70	58	61	63
Russia	29	24	36	31	24
Czech Republic	23	39	16	21	22
China	17	18	18	17	17
USA	19	22	19	8	14
Hungary	8	10	7	7	7
Romania	8	11	7	6	7
France	4	10	9	5	6
Germany	6	7	7	7	7
Etiophia	3	3	3	3	3
Bhutan	4	2	2	3	3
Slovakia	3	4	1	2	2
Other countries	3	4	4	4	4
Total	527	685	587	489	504

Source: own compilation from data of STAT Communication Ltd. Canada
<http://www.statpub.com/statpot.html>

The yields of mustard seed in most of the producer countries is between 500-800 kg per hectare. In some countries, the average yield is nearly 2000 kg per hectare. According to the data of STAT Communication Ltd., the highest average yields (illustrated with grey shadow) were measured in France, Germany and the USA, which countries have relatively lower production area. In the past 5 years, the average mustard seed production is between 750-800 kg per hectare, thus, the Hungarian yield level may be considered as average. From the six leading producer countries Russia is the only which has lower yields (between 450 and 550 kg per hectare, while in the others the average is between 700 and 900 kg per hectare. The average yields of mustard seed in the most important producer countries are summarized in Table 2.

Table 2: The average yields of mustard seed in the main mustard producing countries between 2008 and 2012 (kg per hectare)

Country	2008	2009	2010	2011	2012
Canada	829	980	962	979	895
Nepal	745	747	750	744	745
Ukraine	708	681	605	614	625
Mianmar	721	700	580	691	687
Russia	566	466	478	535	463
Czech Republic	887	925	581	775	777
China	725	766	765	757	754
USA	582	1 074	929	800	805
Hungary	940	763	808	813	807
Romania	851	629	764	685	684
France	1 842	1 979	1 809	1 800	1 844
Germany	999	1 141	1 031	1 015	1 015
Etiophia	666	583	638	596	609
Bhutan	633	772	760	674	659
Slovakia	760	674	394	607	613

Source: own compilation from data of STAT Communication Ltd. Canada
<http://www.statpub.com/statpot.html>

The Hungarian mustard seed market has both organizational and economic problems. In order to determine the organizational problems and to find solutions to improve the situation, the first step was to explore the market connections and the bargaining power of the market players. From economic aspects, it is quite necessary to examine the cost and income values of the sector and also the different technologies in use.

Material and methods

For determining the bargaining power of the players of the mustard seed market I made a survey and also performed depth interviews by the most important stakeholders of the mustard seed sector, focusing at the producers and the buyers in particular. I

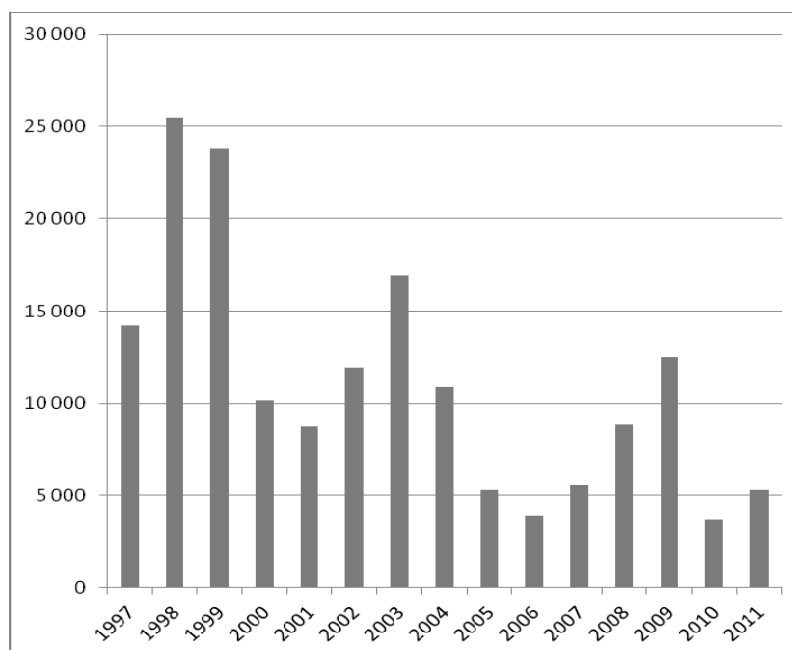
applied Porter's five forces model for the analysis. The cost and income conditions of the mustard seed sector were analysed on the database of 2009, which was made available by the Hungarian Research Institute of Agricultural Economics (AKI). For analysing the Hungarian mustard seed production data I used the data of the Hungarian Central Statistical Office (KSH) and – as primary data – I used the results of my survey that was carried out among Hungarian mustard seed producers.

Analysis of the mustard seed market in Hungary

Mustard seeds can come from three different plants: yellow mustard (*Sinapis alba*), brown mustard (*Brassica juncea*), and black mustard (*Brassica nigra*), which are used for different purposes. Yellow and brown mustard are used for producing mustard cream, mustard powder and whole mustard grains, while black mustard is used for the flavouring of other vegetable oils. (Bi-Weekly Bulletin, 2007)

In Hungary only yellow mustard is produced, the sown area was nearly 35 000 hectares in the 1990s (Eöry and Nagy, 1996) which has been decreased to 3000-5000 hectares by now.

Figure 1: The total harvested area of mustard seed in Hungary (hectares)



Source: based on KSH announcement

The reasons of the decrease of sowing area of mustard seed are very complex and are linked to each other.

I started my analysis with the assessment of market connections, namely, I determined the bargaining power of the stakeholders of the mustard seed sector, the producers, the traders and the processing industry. Through the market analysis of the mustard seed production, I introduce the evolution process of the market, the different

changes occurred in the past years, and I determine the market connections and the market position of the Hungarian mustard seed producers.

The main objective of the Hungarian mustard seed production primarily is the seed production to be used in as seed for sowing, and in a smaller extent, as a raw material of the processing industry. Mustard seed is produced for export; the producers are in direct connections with the exporter or integrator organizations. The processing of mustard seed is made by only domestic companies, producers' connections are made directly with wholesalers and integrators. The situation is the same in mustard cream and mustard powder production. The only processing company is the UNIVER Ltd., which has developed a direct production system and built connections with the most important suppliers.

The most important buyers in the Hungarian mustard seed and industrial mustard market are the following:

- Integrator - KITE Zrt.
- Wholesale trader companies:
 - Monortrade Agricultural, Producing, Trading and Service Ltd. Co.
 - Lajtamag Agricultural Ltd. Co.
 - Hungaro-farm Trading and Service Ltd. Co.
 - Alisca-Mag Ltd. Co.
 - Kaposmag Seed Producing and Sale Ltd. Co.
 - HHH Ltd. Co.
 - RIT-SAT Agricultural and Trading Ltd. Co.
 - GaRa Ltd. Co.

The processing of the mustard seed may be differentiated as primary and secondary processing; therefore, the companies of the processing industry should be also differentiated in this way. During the primary processing, the mustard seed is processed by wet grinding process into mustard cream, and by dry grinding into mustard powder. In the course of the secondary processing, the mustard cream and mustard powder is used as the raw material of the production of different products, such as mayonnaise, ketchup, dressings, sauces, instant soups, spice mixtures, meat products, chips etc.

The most important mustard cream producers in Hungary are:

- Globus Canning Ltd.
- UNIVER Cooperative Ltd.
- Koch's Torma Ltd. Co.

The most important mustard powder producer in Hungary is:

- Monortrade Agricultural, Producing, Trading and Service Ltd. Co.

The products of the members of the Globus Group (Globus Rt, Csaba Konzervgyár Rt.) are mustard cream, mayonnaise, salad dressings, sauces, seasonings, while the main products of the UNIVER Cooperative Ltd. are mustard cream, mayonnaise, sauces, ketchups and seasonings. The Koch's Torma Ltd. deals with mustard cream and salad dressings, the Aranyfácán Product Ltd. produces ketchup and sauces.

Only one company is operated in mustard powder production in Hungary, namely the Monortrade Ltd. produces mild mustard powder.

The market of spice mixtures and seasonings is consisted of many market players:

- Agropack Ltd. Co.
- M Profood Ltd. Co.
- Házi Piros Paprika Ltd. Co.
- Kalocsai Pirospaprika Ltd.
- Podravka Ltd. Co.
- Solvent Ltd.
- Vitapress Ltd. Co.
- Masterfoods Ltd. Co.
- Kotányi Hungária Ltd. Co.
- Papack Ltd. Co.

The most important players of the instant soup market are:

- Maggi
- Knorr
- Podravka International Ltd. Co.

Two companies (representing 80%) are the most important potato and corn chips producers:

- Chio-Wolf Magyarország Kft.
- Lay's Magyarország Kft.

The meat industry and canning industry also play an important role in the secondary processing of mustard cream and mustard powder.

The most significant companies in the Hungarian sausage and salami production are the following:

- Pick Szeged Ltd. (member of Bonafarm Group)
- Herz Szalámigyár Ltd. (member of Bonafarm Group)
- Délhús Ltd. (member of Bonafarm Group)
- Ringa Ltd. (member of Bonafarm Group)
- Debreceni Meat Ltd. (member of Debreceni Group Meat Producing Ltd.)
- Szole-Meat Ltd. (member of Debreceni Group Meat Producing Ltd)
- Csabahús Ltd. (member of Debreceni Group Meat Producing Ltd)
- Zalahús Ltd.
- Gyulahús Ltd. Co.
- Pápai Hús 1913 Ltd. Co.
- Zimbo Ltd. Co.

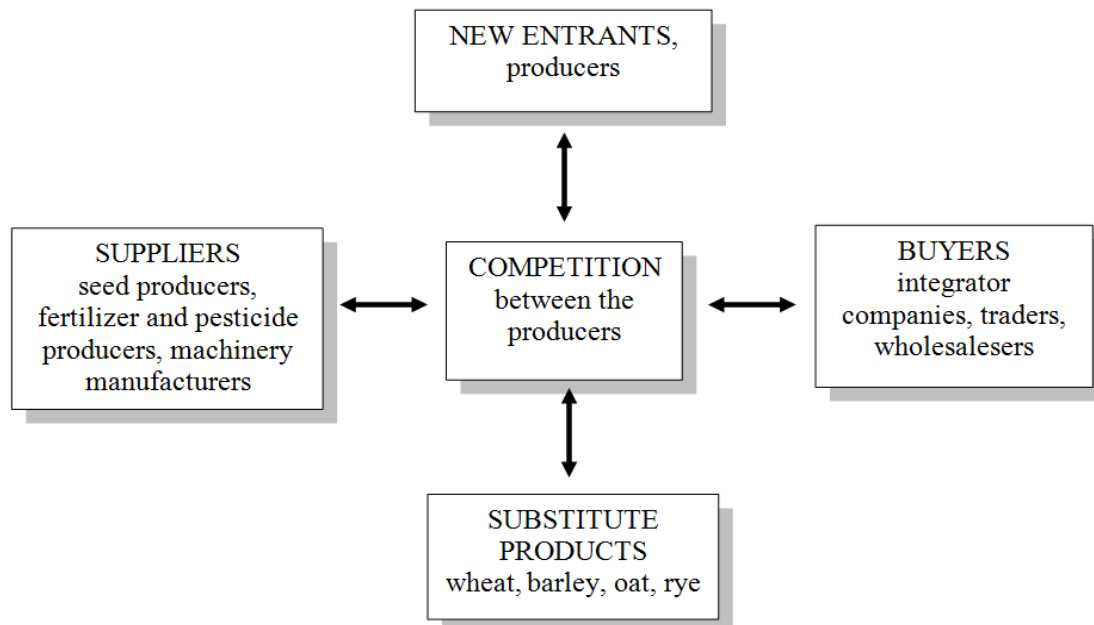
Within the meat industry, the Bonafarm Group has more than 30% market share, therefore this group plays the leading role in the market. The mustard powder is used as seasonings in the meat industry, mainly in sausage and salami production. The most important Hungarian sausage and salami producers are the Pick Szeged Ltd., Herz Szalámigyár Ltd., Ringa Ltd and Csabahús Ltd.

The main players of the canned and pickled vegetable production are the following companies:

- Globus Konzervipari Zrt.
- Csabai Konzervgyár Zrt.
- EKO Kft.
- Nagykőrösi Konzervgyár Zrt.
- REGE Szatmári Konzervgyár Kft.

After collecting the players of the Hungarian mustard seed market, I made an analysis of the market by the five forces model of Michale Porter. The Porter's five forces model of the mustard seed sector is illustrated by Figure 2.

Figure 2: Porter five forces model in the mustard seed sector



Source: own construction

Bargaining power

Analysing the mustard seed market the bargaining power can be summarized as follows:

Suppliers of the mustard seed production are seed producers, fertilizer and pesticide producers and machinery manufacturers. The suppliers market is concentrated and they have well differentiated products, which may increase their bargaining power. Producers have only limited information about their products, which can decrease the bargaining power of the producers. The competition between suppliers groups is represented by mostly the competition of the products; the competition of prices cannot be dominant as a result of the relatively poor financial situation of Hungarian agricultural enterprises.

On the other side of the Porter model, producers have connections with the representatives of buyers; in the mustard sector buyers are represented by the integrator companies, wholesalers and traders. The producers' bargaining power is very low in these relations; they are mostly in price-taking situation, which means they should accept the prices offered by the buyers. When the producer does not accept the price, the contract will not be signed. In some cases, the producers can bargain for a higher price, but this is not a common situation. Prices are strongly determined by the EU market.

The bargaining power between the primary and secondary processing is more complex. The competition in the sector was significantly changed by the transformation that characterizes the retailing sector. The change is manifested in concentration, centralization and internationalization of the stores, which had strong and very quick impacts on the bargaining power of small sized retailers. The intensity of the price competition between the retailer companies is increasing, which affects directly supplier prices. The tendering of the suppliers is a widely accepted method, which is based on the prices, and the compliance with the quality and food safety requirements. The higher is the quality assurance of the suppliers the higher is their bargaining power.

The bargaining power between the producers and the primary processing companies is based on the fluctuation of the yields and the forced sales due to the financial problems, which is a common and widely known situation in the agricultural sector. Consequently, the bargaining power of the mustard seed producers is very low.

Substitute products

Substitute products of mustard seed production can be divided into two main groups. First is cereal production, which competes for the arable land, as most important natural resource of mustard seed production. Cereal production has more advantages in the present circumstances and price and income situation, further improving the cereals market will increase the competitiveness of the cereal sector. As the mustard seed may be produced even in areas with unfavourable soil conditions, therefore its main competitors are wheat, barley, oat and oilseed rape.

It is recommended to evaluate the complementary products as well, because the increased consumption of these products will cause the increase of those products which raw material is the mustard. Mustard seed is a raw material of different food products, for example mustard, mayonnaise, different sauces and salad dressings. These products are associated products of meat and salad consumption, therefore by increasing of the consumption of these products may bring the increase of the demand for mustard products.

The domestic meat consumption tendencies show an increase of the poultry and fish consumption, while the trends of the red meats are lower than the average trends. Mustard is consumed mainly with beef, pig and game meat, therefore the consumption of mustard products might show similar trends to red meats.

The other field of consumption related to mustard is the salad and pasta meals. The increasing trend of healthy diets will increase the consumption of salads therefore the need for salad dressings, sauces and mayonnaise might increase as well. The pasta with different sauces is not among the healthiest foods, but because of the quick cooking, it is very popular for the consumers. The promotion of healthy eating may increase the use of durum pasta foods, which also may improve the need for the consumption of the abovementioned products.

A smaller proportion of processed mustard is used for the production of seasonings and spice mixtures, which is also related to meat consumption, but it is connected directly to sausage and salami consumption. The consumption trend of sausage and salami products is decreasing, mostly as a result of their high fat, cholesterol and spice

content. Their substitute product might be the different ham products, where the mustard-based seasonings and products will not play an important role.

Whole mustard grains are used in the production of pickles and canned vegetable products, which substitute products may be the different frozen vegetables. Fresh vegetables also may be considered as substitute products, particularly in the summer season.

Different snacks and chips also contain mustard powder as additive materials. The consumption of chips may decrease as a result of the promotion of healthy eating, and they might be substituted by different healthier seeds.

Threat of new entrants

The threat of new entrants are relatively low in the mustard seed sector, the technology and the machinery are the same as in the cereal production, so there is no need for special knowledge or technologies. As mustard can be grown either in less quality soils, therefore good soils can be used for other field crops. The only significant threat of entrants is selling, which may cause many problems for the producers, as it is very hard to get good contracts in appropriate time, because of the unstable prices and the uncertain yields. In case of not fulfilled contracts, the producers must pay penalty. The barriers of the entrance into the mustard seed market are relatively low. However, when according to the market forecasts higher prices may be expected in the next year, more agricultural producers will grow mustard seed. In the other segments of the mustard market, it can be stated that the development process of the market is very slow, and its attractiveness is very low. In the beginning of the 2000s as a result of the EU accession process many European countries entered into this market, but after the economic crises several companies went to bankrupt or were transformed, mostly in the meat processing industry. There were significant changes in the canning industry because of the strict quality, hygienic and food safety requirements. As the industries connected to the mustard market generally may be characterized with low profit rate and slow growth, the threat of the new entrants will not be significant in the future as well.

Market competition

The different tools of market competition may be differentiated as tools of price competition (for example price reduction, different terms of payment or delivery) and tools of non-price competition such as product competition or sales promotions.

The competition between producers is very intensive and it is manifested in price competition. The price competition could be decreased by the concentration of the market, the cooperation of the supply chain and by establishing of long-term supplier contracts and sales contacts. According to the results of my survey the connections between the producers and traders has deteriorated because of the uncertain fulfilment of the contracts. Nowadays the producers hardly enter into contracts in advance, they try to sell their yield after harvesting at an ad hoc basis.

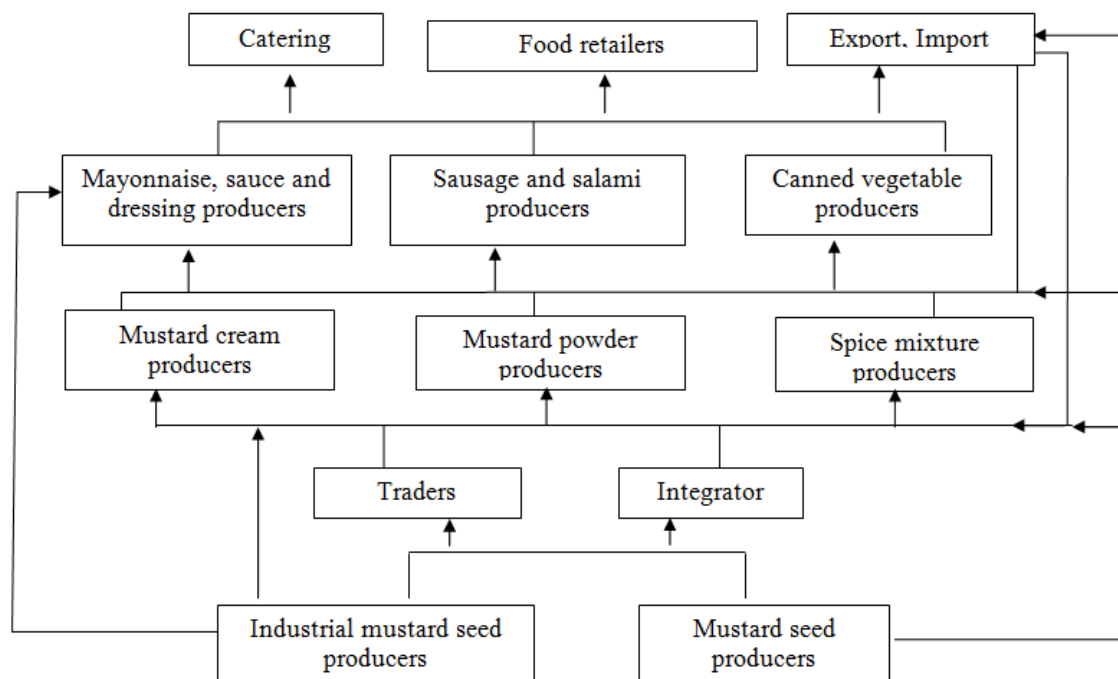
In the production of spice mixtures, seasonings, sausages, salamis, canned vegetables and pickles the price competition is determinant, the importance of product competition is very low. In the market of mustard creams, mayonnaise, sauces,

dressings instant soups and chips the brand and sales promotion have also appeared besides the price competition. In these markets, the strong price competition may be reduced by the coordination the supply chain and by establishing long-term supply and sales relations. By the reduction of the players of the market the market concentration might be increased which could improve the transparency and the coordination of the whole market of the mustard products. At the level of mustard seed production, the improving of information supply would be needed for which the support of the state and the professional organizations is also required.

Distribution channels

Figure 3 summarizes the distribution channels of the mustard seed sector and the complex scheme and the different directions between the different participants.

Figure 3: The distribution channels of mustard seed



Source: own construction

When examining the distribution system of the Hungarian mustard sector, it can be stated that the production is based mostly on mustard seed production, while the production for industrial use it is rather low, it is represented by only a few producers, who produce directly for the mustard processing industry. The mustard powder and mustard cream producers and the processing companies use mostly imported raw materials for mustard production. The greatest share of the produced mustard seed is for export, the producers have direct connections with the integrators and the traders.

The vertical integration is not typical in this sector, particularly in the connection of the producers and the companies working in primary processing. There are special cases for vertical integration, where the enterprise takes part simultaneously in the

primary and the secondary processing when producing mustard cream, mayonnaise and sauce products as well. The backward type integration is represented by those enterprises which produce mustard powder. This situation is similar to the pig sector, where the big slaughter houses and processing companies formerly had own pig farms and plant producing divisions as well (Lehota and Illés, 2001).

The most widely used enterprise forms in the mustard sector are limited companies, joint stock companies and partnership. The cooperative form occurs mostly among the producers.

There are not such organizations in Hungary that may give professional support for the players of the mustard sector. During the survey, none of the respondents mentioned the possibility of taking part in education, or professional trainings. The lack of these services may be one of the reasons of the general lack of information, and the relatively low professional knowledge of the producers. According to the traders, producers make many mistakes during their decisions connected to the production; they use not appropriate technology, which increase the risk of market failures. The Hungarian Seed Association coordinates the mustard seed production, but nowadays the Hungarian mustard seed production has lost its dominancy and the mustard seed for green manure production became more important instead.

Despite its relatively low share in the field crop production, the institutional background of the mustard sector should be built on the example of the cereal sector even by the cooperation of other, less significant crops. (Lehota, 2001)

The informational background of the mustard sector is very poor, the Hungarian Central Statistical Office (HCSO) has only very few data about the mustard sector. For my researches, the HCSO has made available the data for the area of mustard seed production and the yields since 1997 at county level, and there has been information about the foreign trade activities since 2003. The foreign trade data include the amount, the value of exports and imports, according to the countries of destination, but the export data of mustard seed production and industrial mustard seed are aggregated. In the foreign trade statistics, the mustard powder and the mustard cream are also presented together with other product groups. Neither the export-import balance of the products, nor market and yield forecasts are made for the products of the mustard sector.

In order to improve the competitiveness of the Hungarian mustard sector it is essential to establish a supporting institutional background for providing information for the producers and to conduct professional trainings and knowledge sharing possibilities for them. Without these steps and without coordination the Hungarian mustard sector cannot be successful.

During my researches, I also examined the establishment of the most important foreign institutional systems – particularly the operation of the coordination level and the institutions of the Canadian mustard sector – that may be used as “best practice” in the Hungarian circumstances.

Economic analysis of Hungarian mustard seed producing farms

After the exploration of the relationship between the players of the market, I made economic calculations on the mustard seed production data, to determine the cost and income data of mustard seed production in Hungary, per hectare.

At first, I made my calculations on the base of the data of 2009 from the five-year long database, because the number of the Hungarian mustard seed producers was the largest (54 farms) in this year in this five-year period. I calculated the arithmetic average of the cost and total revenue data of the 54 farms; by with I created the data of an “average” Hungarian mustard seed producer farm. The main data of this average farm are summarized in Table 3.

Table 3: Cost and total revenue data of an average mustard seed producer farm

Description	Values for the average farm (HUF/ha)
Total revenue	159 945
Average yield (t/ha)	0,8
Price (HUF/t)	199 932
Total direct variable costs	53 569
Machinery costs	31 017
Costs of equipment and devices	2 591
Costs of machinery services	11 932
Wages	8 790
Public contribution of wages	2 894
Land lease cost	17 790
General costs	6 935
Depreciation	16 436
Direct governmental support	49 906

Source: own calculations based on the primary data of the Hungarian FADN system (AKI, 2009)

The direct variable costs contain the costs of seed, fertilizers, pesticides as well as the direct marketing, insurance and other variable costs of the farms. Machinery costs include the costs of tractors, transportation vehicles and harvesting machines. Wages represent the salary of the permanent employees, family members working on the farm and the costs of casual labour (which was indicated by only three farms). The total direct support of the farms was 49 906 HUF per hectare in the examined year. The income categories of the average farm and the results of break-even analysis are given by Table 4.

Based on the results of my calculations it can be stated that in case selling of the products at the average price, variable costs can be covered by 0,242 tonnes of yield per hectare. This amount is below the average yield per hectare (which is 0,803 tonnes) and the 561 kilograms difference between the two yields should cover the sum of the indirect variables costs, the fixed costs and the minimum expected profit. The average costs calculated without wage costs is 168 879 HUF per hectare, which means the threshold price of profitability; the average cost calculated by total variable costs is

132 033 HUF per tonne, which determine the threshold price of production. More than 75% of the examined farms could reach the average price of 180 000 HUF/tonne, which exceeds the threshold price of profitability by 11 121 HUF, but in 13% of the farms even the threshold price of production could not be reached.

Table 4: Calculations of income categories and break-even analysis according to the average farm results

Total revenue; HUF/ha	159 945
Direct variable costs; HUF/ha	48 402
Gross margin; HUF/ha (for direct variable costs)	111 544
Average yield; t/ha	0,8
Cost of production; HUF/t (for direct variable costs)	60 503
Break-even point; t/ha (for direct variable costs)	0,242
Total costs without wages; HUF/ha	135 103
Average costs; HUF/t (without wages)	168 879
Total variable costs; HUF/ha	105 626
Average costs; HUF/t (for total variable costs)	132 033
Break-even point (yield); t/ha (for total variable costs)	0,528
Total costs; HUF/ha	146 787
Net income; HUF/ha	13 159
Break-even point; t/ha (Total revenues=Total costs)	0,734
Direct governmental subsidies; HUF/ha	49 906
Net income with subsidies; HUF/ha	63 065
Break-even point with subsidies; t/ha (Total revenues=Total costs)	0,56

Source: own calculations based on the data of Table 3

The break-even, calculated for the total revenues and costs, excluding subsidies is only 66 kg under the yield of the average producer farm. What is a high risk in case of minimal decreasing yield, the farm is producing immediately losses.

100 per cent of the farms receive direct payments, which average value is 49 906 HUF/hectare, by which value the net income and the yield level of the break-even point shows a significant increase. The difference between the yield amounts that covers total costs (break-even points with and without subsidies) is 174 kg, which means that the value of the support can compensate a 24% yield loss.

In accordance with the abovementioned, I made calculations for the remaining four years, which results are summarized in Table 5.

Table 5: Cost and total revenue data of the average mustard seed producer farms between 2007-2011 (HUF/ha)

Description	2007	2008	2009	2010	2011
Total revenue	67 983	174 777	159 945	94 869	162 166
Average yield (t/ha)	0,63	1	0,8	0,65	0,98
Price (HUF/t)	107 910	174 777	199 932	145 953	165 475
Total direct variable costs	29 486	46 428	48 402	33 551	43 982
Machinery costs	22 838	23 677	31 017	30 044	30 270
Costs of equipment and devices	1 997	2 400	2 591	406	2 323
Costs of machinery service	8 340	15 907	11 932	4 788	6 383
Wages	6 810	6 154	8 790	8 729	10 443
Public contribution of wages	2 899	2 250	2 894	2 616	3 124
Land lease cost	7 026	15 199	17 790	14 876	15 833
General costs	4 300	6 766	6 935	4 569	5 868
Direct governmental support	40 384	44 903	49 906	60 293	66 014

Source: own calculations based on the primary data of the Hungarian FADN system (AKI, 2007-2011)

In the examined 5-year period, a significant fluctuation of the yields, price and machinery costs may be observed. The fluctuation of the yields may be resulted partly by the adverse weather conditions, but it is also caused by using the not appropriate technology. The hectic changes of the prices are influenced by external factors such as the international market conditions, particularly the Canadian yields and market prices.

The average price of land rent has doubled between 2007 and 2008, and since then it has been relatively stable. According to the data, it can be stated that 65% of the mustard seed producing farms rent the total area that is used for mustard seed production.

The direct support has increased continuously, by 65% between the initial year of the examined period (2007) until 2011. This increase has induced a very positive change in the mustard production in Hungary, because – as it was mentioned in the previous calculations – it has a strong compensating effect against yield decrease.

The costs, the income categories and the results of break-even analysis, which were calculated from the basic data of the 5-year period, are summarized in Table 6.

The amount of the break-even point with subsidies was between 0,51 and 0,61 tonnes per hectare in the examined period, which quantity is very close to the average yields (between 0,63 and 1,00 tonne per hectare). The net income calculated without the support has produced losses for the average farm in 2007 and 2011, which implies that the increase of the subsidies can be a very positive external impact for the mustard seed sector and it represents a compensation function against the yield losses. The agricultural subsidies and payments generally play a significant role in the whole agricultural sector of Hungary and strongly determine the competitiveness of the different sized farms and different types of farming (see Illés et al., 2012; Dunay and Illés, 2013).

Table 6: Calculations of income categories and break-even analysis according to the average farm results between 2007-2011

Category	2007	2008	2009	2010	2011
Average yield (t/ha)	0,63	1	0,8	0,65	0,98
Break-even point ; t/ha (for direct variable costs)	0,27	0,26	0,24	0,23	0,26
Break-even point; t/ha (Total revenues=Total costs)	0,92	0,76	0,73	0,83	0,81
Break-even point with subsidies; t/ha (Total revenues=Total costs)	0,58	0,61	0,56	0,51	0,58
Price (HUF/t)	107 910	174 777	199 932	145 953	165 475
Average costs; HUF/t (without wages)	112 325	155 778	168 879	136 716	150 516
Average costs; HUF/t (for total variable costs)	114 873	96 816	132 033	123 283	98 495
Net income	-31 586	41 751	13 159	-25 849	28 186
Net income with subsidies (HUF/ha)	8 798	86 654	63 065	34 444	94 200

Source: own calculations based on the data of Table 5.

In order to explore the relations between the factors which may influence the average yields, I examined the farm level data of 2009 (i.e. that year, when the greatest number of farmers could be observed in the mustard sector in the examined period).

The farms were ranked according to their average yields into quartile groups, then I determined the average of all farms and the average yields of the lower and upper quartile groups (lower 25% and upper 25%). I also calculated the average value of other important data of the farms related to the mustard production, both for the lower and upper quartile groups and the average of the total farms. The results of my calculations are summarized by Table 7.

Table 7: The production data of the lower and upper quartile groups of the farms, ranked according to the average yields

2009	Average of lower 25%	Average	Average of upper 25%
Average yield (kg/ha)	383	800	1340
Income (HUF/ha)	11 176	58 131	116 989
Total revenue (HUF/ha)	68 170	154 303	246 741
AK (land value unit)	21	22	27
Seed costs (HUF/ha)	6 389	8 453	9 242
Fertilizer costs (HUF/ha)	10 087	20 700	32 243
Pesticide costs (HUF/ha)	12 258	16 646	22 287
Machinery costs (HUF/ha)	30 459	31 017	26 140
Total costs (HUF/ha)	113 850	149 780	182 852
Nitrogen (kg/ha)	25	57	80

Source: own calculations based on the primary data of the Hungarian FADN system

According to the data of Table 7, it may be observed that the farmers in the lower 25% group could reach only 383 kg yield per hectare, while the average yield of the

upper 25% was 1340 kg per hectares. Although no relation could be detected between the correlation coefficients, it may be clearly observed from the calculations that the farms in the upper quartile group had better quality of soils (with higher AK units) and they have higher seed, fertilizer and pesticide costs, and higher nitrogen doses than in the farms of the lower quartile groups. The higher land value units and the higher nitrogen doses may justify that despite the mustard is known as an undemanding plant species, it will benefit the better soils and the reasonable nutrient doses. Higher seed prices may be resulted by using sealed seeds, while the higher fertilizer and pesticide costs prove that the higher costs are needed to reach the higher yields.

Conclusion

The analysis of the connections between the shareholders of mustard seed production showed that producers have not strong bargaining power opposed either to the suppliers or to the buyers, as a result of their poor financial conditions the Hungarian mustard seed producers should be considered as market players with price-taking attitudes.

The economical analyses show that the profit per hectare without any subsidies is very low, so in case of a minimal variation in yield the production of mustard seed is already unprofitable. The break-even point calculated with subsidies has changed slightly (between 0,5 and 0,6 tonnes per hectare), while its level without subsidies has increased significantly and could not reach – or just slightly has exceeded – the yearly average yield. It means that the supports play an extremely important role in the profitability of the mustard seed-producing sector.

After the overall examination of the factors influencing the yields, it can be stated that by using the appropriate quality and quantity of inputs (sealed seeds, fertilizers, pesticides etc.) not the production costs but also the yield level will be higher, which will result in the increasing profitability and the competitiveness of the Hungarian mustard seed sector.

Most of the farmers have left the mustard seed market due to the unfavourable market circumstances and the low profit level, which is convinced by the continuously decreasing harvested area. The market circumstances could be optimized through establishing a farmer association, which would contribute to better market conditions and increasing sales opportunities. To reach higher profitability per hectare the farmers need to increase the yield per hectare what is achievable through improving the production technology and increasing the attention towards mustard seed.

The proposed changes would result in an increasing willingness to invest in mustard seed what would be manifested in the growth of the production area.

References

1. Bi-weekly Bulletin (2001): Mustard seed: Situation and outlook, Bi-weekly Bulletin Vol. 14. No. 8. Agricultural and Agri-Food Canada

2. Bi-weekly Bulletin (2007): Mustard seed: Situation and outlook, Bi-weekly Bulletin Vol. 20. No.11. Agricultural and Agri-Food Canada
3. AKI (2010): Hungarian Research Institute of Agricultural Economics, Hungarian FADN system, database of 2009.
4. Dunay, A.; Illés B. Cs. (2013): The Impacts of EU Accession on the Competitiveness of Hungarian Agricultural Enterprises of Different Farm Types. In: Elena Horska, Iveta Ubreziová (eds.) Proceedings of International Scientific Conference “Business Management – Practice and Theory in the 21st Century”, Slovak University of Agriculture, Nitra, pp. 646-653.
5. Eöry, T.; Nagy, B. (1996): Így termesszünk repcét és mustárt. Gazda Füzetek 6., Regicon Kft., Kompolc
6. Illés, B. Cs; Dunay, A.; Pataki, L. (2012): The impact of EU-accession on the economic support level of farms in Visegrad countries; Annals of the Polish Association of Agricultural and Agribusiness Economists 14: (6) pp. 95-98.
7. Illés Cs. B., Podmaniczky L. (1999): Reconciliation of crops and livestock on small-scale farms in Hungary. East-West Journal of Economics and Business 2:(1-2) pp. 58-61.
8. KSH (2013): Hungarian Central Statistical Office (KSH) announcement
9. Lehota, J.; Illés, B. Cs. (2001): Hold-up problems and Institutional Strategy in the Hungarian Pig Sector, Institutional Economics and Food Sector in Poland, Hungary and the Czech Republic, Implications for EU Integration, Warsaw, pp. 81-97.
10. Lehota, J. (2001): A vertikális koordináció és a szerződéses kapcsolatok a búza-vertikumban, Marketing és Menedzsment, 5-6. szám, Budapest, pp. 45-52.
11. STATpub - <http://www.statpub.com/statpot.html> [Retrieved on 2013-04-19]
12. Szakál F.; Illés B. Cs. (1993): Problems and prospects of redirecting Hungarian agriculture towards sustainable development. Landscape and Urban Planning 27:(2-4), pp. 223-229.
13. Törő-Dunay, A. (2011): Development of Rural Areas through CAP 2020 and Europe 2020 Strategy. Scientific Journal of Warsaw University of Life Sciences – SGGW – Problems of World Agriculture, Volume 11 (XXVI) 2011. Number 3., pp. 161-169.