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Czech Republic as an Important Producer of Poppy Seed

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Anotace

Mák setý (*Papaver somniferum* L.) je důležitou olejninou, jejíž pěstování má v Čechách dlouholetou tradici. Mák pěstovaný v České republice vykazuje dobrou kvalitu, a proto získává přednost před mákem produkovaným v jiných částech světa. Česká republika je tak hlavním světovým producentem makového semene a je i nositelem evropských a světových cen. Co se týče obchodu, ČR je rovněž hlavním obchodníkem s makovým semenem a to jak v Evropě, tak i ve světě. Mák je v ČR plodinou vykazující dlouhodobě vysoký podíl exportu na produkci, protože domácí spotřeba se pohybuje pouze mezi čtyřmi až pěti tisíci tunami. Významným odbytištěm našeho máku jsou evropské státy s obyvatelstvem slovanského původu nebo ovlivněné slovanskou kuchyní a zámožské země, kde žijí slovanští vystěhovalci. Článek poukazuje na postavení ČR jakožto významného činitele světového trhu s makovým semenem. Prostřednictvím analýz poskytuje údaje o postavení české produkce a obchodu ve světě. Analyzovány jsou vedle vývoje produkce a obchodu i některé další faktory ovlivňující ekonomiku v oblasti tržní produkce makového semene (ceny, hektarové plochy, výnosy, objem produkce, objem obchodu). Cílem je charakterizovat současné postavení české produkce a obchodu s makovým semenem ve světě.

Klíčová slova

Makové semeno, produkce, obchod, import, export, svět, trh, komparativní výhoda, kilogramové ceny.

Abstract

Poppy seed (*Papaver somniferum* L.) is an important oilseed, whose cultivation has a long tradition in the Czech Republic. Poppy seed grown in the Czech Republic has good quality and, therefore, is preferred to poppy seeds in other parts of the world. The objective of this paper is to characterize the current position of the Czech poppy seed production and foreign trade in the world. Czech Republic is the main world producer of poppy seed and price maker of the European and world prices. With regards to trade, the Czech Republic is also the main producer and seller both in Europe and in the world. The poppy seed crop grown in the Czech Republic is mainly produced for exports, because the domestic consumption consists of only between four and five thousand tons. Major export markets of Czech poppy seed are European countries with a population of Slavic origin or those influenced by Slavic cuisine. Another important markets are overseas countries, that were settled by Slavic immigrants. The paper stresses out the position of the Czech Republic as a major player in the world market with poppy seed. The paper provides analysis of the market position of the Czech production and Czech foreign trade participation. Development of production and trade, as well as some other factors affecting the poppy seed economy, are analyzed such as prices, hectareage, yields, volume of production and volume of trade.

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Key words

Poppy seed, production, trade, import, export, world market, comparative advantage, kilogram prices.

Introduction

Papaver somniferum (poppy) is cultivated as an annual crop in countries such as China, India, Czech Republic or Turkey. Poppy is grown mainly for its content of opium and oil seed. The seeds are used almost exclusively for their oil (Nergiz and Ötles, 1994; Bozan and Temelli, 2003; Özcan, Atalay, 2006). Poppy seeds contain up to 50% oil and Indian cultivars have high levels of oleic and linoleic acids (Singh et al.1990). Singh et al.(1995) have indicated the potential for this crop as a source of linoleic acid. Poppy seed oil appears to be of good quality for human consumption since it is generally rich in polyunsaturated fatty acids (Baydar, Turgut, 1999; Luthra and Singh, 1989; Krzymanski and Jonsson, 1989; Bozan and Temelli, 2003; Özcan, Atalay, 2006).

In Europe, poppy seeds are mostly used for confectionary, similar to the use of sesame seeds and are used extensively in baking and sprinkling on rolls and bread. The seeds are a good source of energy. They are also the source of a drying-oil, used for the manufacturing of paints, varnishes, and soaps, and in foods and salad dressing. Oil cake is a good fodder for cattle (Guil et al.1998; Özcan, Atalay, 2006).

Poppy seed cultivation especially for foodstuff purposes has a long tradition in the Czech Republic (details about the production see table 1). Czech poppy seed is known especially for its cleanliness as the grain is not polluted by alkaloids. This pollution occurs in case of crop varieties with high content of morphine, which is not grown in the Czech conditions. Poppy seed crop in the Czech Republic (but also in other countries) is referred to as the source of the addictive substances, therefore the cultivation of poppy must necessarily to comply with the provisions of Act No. 167/1998 Sb.. Part of this law are provisions related to the reporting obligation of persons producing poppies on a surface greater than 100 m² and exporting or importing the seed. In this context, it is appropriate to stress out that in many countries of the world are administrative obstacles for the cultivation of the poppy so significant that the commercial production of the poppy is almost impossible. This is according to the authors advantageous for the Czech Republic and some other producers as it is a very significant competitive advantage.

Poppy seed plays, in particular for the excellent dietetic properties, an important role in human nutrition (bakery and confectionery). Given the

content of certain major alkaloids (morphine, codeine, papaverine, etc.) poppy seed is an important raw material for the pharmaceutical industry. With regards to poppy seeds, the Czech Republic controls approximately 33% of the world production and about 28% of the value and about 44% of the volume of world trade with poppy seed. In recent years, the poppy seed area increased significantly, which is confirmed by the sow of poppy seed in the period 2008 on around 70 thousands hectares. In this context, however, it has to be noted that in the years 2009 and 2010 there has been a rapid reduction in production due to the very significant drop in prices, which is due to the current dominance of supply over demand both in the European and world markets. In 2010, sown areas were on the level of about 50 thousands hectares. However, it is appropriate to emphasize that this area is significantly higher in comparison with the areas from the 1990s. The reduction in the areas caused also a significant reduction in the production of poppy seed, which in 2010 was on 25 thousand tons (which means a significant reduction compared to its peak period of 2008). The cost of production per one hectare of poppy seed, depending on the intensity of cultivation, is about 20 000 CZK. The poppy seed has no special requirements on the environment. It can be successfully grown especially in the potato areas. However, it very sensitively responds to the imbalance and variations in soil, nutrition and weather.

The theoretical yield of poppy can be between 1.8 to 2.9 tons per hectare. The cost of poppy cultivation in the CR is relatively low. This is because the technology is based upon mass production, very similar to cereal cultivation technology. Mechanization has similar equipment, albeit with many changes for the poppy harvest, drying and separation and poppy seeds. For Czech farmers, as well as business organization it is a profitable commodity as poppy seed production is largely exported. High quality standard poppy seed, minimal damage to the seeds, the minimum content of impurities, uniform color, size of lots, sales culture, promotion of Czech production, but also relatively low price have enabled Czech farmers to massively penetrate foreign markets. Czech position on foreign markets has been also strengthened by crop failures and a decrease in poppy production in Turkey and Tasmania.

	CZV - CZK	Production in tonnes	Yield tonnes per hectare	Harvest area	Czech exports in tonnes	World exports in tones	World production in tonnes	World price USD/kg
1993	46 421	6 890	0,78	8 814	5386	37588	24704	1.030462
1994	42 423	16 471	0,57	28 726	20288	61128	49485	1.04803
1995	22 345	25 053	0,73	34 308	15977	46185	70232	0.985688
1996	35 820	9 654	0,68	14 271	15190	48201	26639	0.824838
1997	41 145	9 515	0,57	16 641	10752	48800	43092	0.992561
1998	31 724	20 524	0,74	27 881	16434	67561	67856	1.052012
1999	22 452	28 509	0,63	45 462	20220	70704	79849	0.795995
2000	39 148	13 607	0,46	29 871	16028	56696	41820	0.729593
2001	26 036	21 294	0,64	33 235	15187	62435	56233	0.741315
2002	26 937	16 918	0,57	29 637	18198	65489	51383	0.743041
2003	26 853	19 544	0,51	38 147	13148	75229	89176	0.891212
2004	27 847	24 821	0,9	27 611	20946	70801	65326	1.193797
2005	28 253	36 418	0,82	44 613	28167	78514	74816	1.303755
2006	38 290	31 591	0,55	57 785	29326	85411	80673	1.490335
2007	68 822	33 101	0,58	56 914	30321	92367	60939	2.305076
2008	29 302	49 428	0,71	69 793	28082	71113	78850	3.804733
2009	22 124	33 741	0,63	53 623	30697	69212	98835	2.062104
2010	20 000	25 469	0,5	51 103	28840	67839		1.805304

Source: Ministry of Agriculture, Czech Statistical Office

Table 1: Basic characteristics of the poppy production in CR.

Methodology

Processed article defines the position of the CR as a major global producer and marketer with poppy seed. The aim is to assess the current position of the CR on the world market and to identify some important factors influencing the development of the Czech extension of world trade in poppy seed.

In terms of methodology, the analytical part of the paper is divided into the following two parts. The first part analyzes the production of poppy seeds. Analysis of the production is processed on a territorial basis, with an emphasis on analysis of production in major territories, which are Europe, Asia and Oceania. Emphasis is given to European countries - especially to the Czech Republic as the most important producer in Europe. This section of the paper analyzes the evolution of global production in the years 1961-2009, with some analysis, due to the breakup of Czechoslovakia and establishment of independent Czech Republic being focused on the period of 1993-2008 (2008 in this regard is chosen as the final year because it is a year immediately preceding the global economic crisis that also hit the global trade in poppy seed and also due to data availability). Volume production is studied in tons, whereas also differences between

regions are analyzed in terms of yield and cultivated area. Basic statistical and mathematical indicators such as base index, chain index, or average are used in this section.

In the second part, the global trade in poppy seed is analyzed, while emphasizing the CR position as a leader of world trade both in terms of value and volume of trade. The analysis of the different countries importing and exporting poppy seed is conducted. Volume (in tons) and value (in USD) trade (export and import) are analyzed. In particular, kilogram export and import prices and the differences that exist between countries and regions are subjected to research. The analysis is performed again by basic statistical tools (base and chain index, averages, etc.). The final part consists of assessment of comparative advantages of individual regions in terms of their poppy seed exports. Analysis of comparative advantage is conducted through the RCA1 (revealed comparative advantage) index calculation. The concept of the RCA1 index is based on the Balassa Index (Balassa, 1965). The Ballasa index provides a simple overview of the comparative advantage distribution (e.g., Proudman and Redding, 2000; Hinloopen and Marrewijk, 2001).

Revealed comparative advantage index (RCAI – global/regional level)

$$RCAI = (X_{ij}/X_{nj})/(X_{it}/X_{nt})$$

where: X represents exports

i represents the analyzed country

j represents the analyzed sector of the economy (sector of industry or commodity)

n represents the group of countries or world

t represents the sum of all sectors of the economy or the sum of all commodities or the sum of all branches

The RCAI index analyzes the exports of commodity “j” in the case of country “i” in proportion to the total exports of the given country and the corresponding total exports of the analyzed group of countries or of the whole world (Hinloopen, Marrewijk, 2001 and Utkulu, Seymen, 2004). A comparative advantage is then accepted if the RCAI index value is greater than 1. If, however, the result of the calculated index is less than 1, it may be asserted that the given country has a competitive disadvantage in the case of the given commodity or group of commodities (Qineti, Rajcaniova, Matejkova, 2009).

Results and discussions**The production of poppy seed in the world**

World production of poppy seeds is increasing (Table 2). While in the early sixties of the 20th century, the world produced about 50 thousand tons annually, in 2009, the world production stands at about 100 thousand tons. If we analyze the evolution of global production of poppy seed, it is clear that the output behaves in a very unstable manner. Average annual growth rate of production calculated by geometric average over the period 1961-2009 ranged to about +0.9%. During the analyzed years, production fluctuated in the range of 23 thousand tons (1968) and about 100 thousand tons (2009). Production varies greatly. Strong momentum has taken the world production poppy seeds in the nineties of the 20th century. In the years 1993-2009 the growth rate of world production rose to about 8% annually. As to the territorial structure of world production poppy seeds, it can be stated that dominance can be recognized in Europe. Europe’s share of world output (world production is without production of Oceania - Oceania data are not available) has long

Production (tonnes)	1961	1971	1981	1991	2008	2009	Share on global production 1961	Share on global production 2009	Share on global production 1961-2009	Rate of growth 1961-2009	Rate of growth 1993-2009
World	52752	35818	28509	43516	78850	98835				1.009	1.08
Europe	33052	20842	15067	20978	66266	62441	62.66%	63.18%	64.24%	1.015	1.077
European Union	16332	12463	9975	9267	65330	57729	30.96%	58.41%	49.91%	1.03	1.079
Eastern Europe	24691	13679	8328	14811	55363	38938	46.81%	39.40%	42.68%	1.017	1.107
Czechoslovakia	13400	6192	3755	10876	x	x	25.40%	0.00%	29.70%	N/A	1.119
Czech Republic					49248	32692	0.00%	33.08%	17.96%	N/A	1.14
Asia	19700	14976	13442	22538	12584	36394	37.34%	36.82%	35.76%	0.991	1.1
Western Asia	18700	13976	11442	22538	12584	36394	35.45%	36.82%	33.62%	0.992	1.1
Turkey	18700	13976	11442	22538	10384	34194	35.45%	34.60%	32.73%	0.988	1.086
Western Europe	4790	2392	5209	4976	9867	11791	9.08%	11.93%	15.97%	1.015	1.023
Spain				300	6500	7000	0%	7.08%	1.8%	1.033	1.087
France	456	190	2000	800	5000	6500	0.86%	6.58%	4.99%	1.052	1.063
Hungary	6821	5472	3773	3335	3300	3458	12.93%	3.50%	8.49%	0.985	1.016
Germany	2816	786	2625	3200	2800	3294	5.34%	3.33%	6.18%	1	1
Romania	4100	1900	800	600	1600	1956	7.77%	1.98%	4.37%	0.98	1.203
Austria	1056	138	206	442	1567	1504	2.00%	1.52%	1.70%	N/A	1.074
Slovakia					1215	832	0.00%	0.84%	0.82%	N/A	0.953

Source: FAOSTAT, own computation

Table 2: Development of global production poppy seeds.

been at over 60%. Asia and Oceania, as with other major producers accounts for approximately 35%. As for Europe, the world production is dominated mainly by Eastern Europe (the share in world production in 1961-2009 to more than two-fifths). The proportion of western and southern Europe in world production in the period was about 16% and 4.4%. As for Asia, there is a dominant producer fields western Asia - Turkey in turn comes from about 30% of world production of poppy seed. As Oceania, there are the dominant producers of Australia - especially Tasmania.

In terms of Europe and the world, the dominant producers are found in the following countries (share of world production in the period 1961-2009 - according to FAO): the former Czechoslovakia (30%), France (5%), Hungary (8.5%), Germany (6.2%), Romania (4.4%), Austria (approx. 2%). However, the above data are only averages for the reporting period. Over the past 50 years, the situation has changed dramatically and is currently (2009) as follows. These countries are dominant starting with the CR (33%), Turkey (34.6%), France (6.6%), Hungary (3.5%), Germany (3.33%), Romania (1.92%) and Austria (1.52%) and Slovakia (approx. 1%). In terms of growth rate the highest rate in the years 1993-2009 points to the following producers: Romania (20% / year), Czech Republic (14% / year - however we are currently witnessing a significant stagnation), Turkey (8.6% / year), Austria (7% / year) and France (6% / year). The Czech Republic during the years has significantly strengthened its position in the world market and, together with Turkey represents approximately 2/3 of world production. A very important factor influencing the

production of poppy seed is harvested area (Table 3).

In the world, the harvested area is roughly 140 thousand hectares. It oscillates very significantly depending on the world price and other factors such as weather, administrative regulation, stocks, etc. In the years 1961-2009 harvested area oscillated between 30 thousand and 160 thousand hectares. The distribution of harvested areas in the world more or less corresponds to the level of world production. According to FAO (2009), majority of the harvesting areas for the production of poppy seed is located in Europe at about 80%.

In terms of the major producers, most of them are currently located in the EU (about 90 thousand hectares). In other European countries the harvested area represents the range of 1 thousand to 2 thousand hectares. Outside Europe, the next major harvests are located in Oceania and Asia. Next big player is then mainly Turkey, where the poppy seed harvested at approximately 49 thousands hectares. In Europe, the states with the most important harvest areas: the Czech Republic, France, Hungary, Germany, Romania, Austria and Spain. Particularly significant is the Czech Republic, which takes approximately 38% of the world crop areas. In 1993-2009 the highest rate of growth in crop area recorded in the following countries: Romania, Republic, Austria, Turkey, France and Spain. If we analyze the development of harvest areas is also worth emphasizing that the harvest area tend to change very much as has been said above. It is not a stable condition. For example, if the current EU-27 harvested area in the years 1961-2009 oscillated between about 14 thousands

Area Harvested (Ha)	item	1961	Share	1993	Share	2009	Share
World	Poppy seed	100 698		35 631		140534	
Europe	Poppy seed	61 998	61.57%	28 690	80.52%	91501	65.11%
European Union	Poppy seed	35 605	35.36%	27 060	75.95%	88377	62.89%
Czech Republic	Poppy seed		0.00%	8 814	24.74%	53623	38.16%
Asia	Poppy seed	38 700	38.43%	6 941	19.48%	49033	34.89%
Turkey	Poppy seed	38 700	38.43%	6 941	19.48%	48893	34.79%
France	Poppy seed	445	0.44%	4 000	11.23%	10000	7.12%
Hungary	Poppy seed	18 821	18.69%	3 755	10.54%	3928	2.80%
Germany	Poppy seed	4 507	4.48%	4 000	11.23%	5283	3.76%
Romania	Poppy seed	8 400	8.34%	200	0.56%	3291	2.34%
Austria	Poppy seed	1 166	1.16%	551	1.55%	2186	1.56%
Slovakia	Poppy seed		0.00%	4 300	12.07%	1904	1.35%

Source: FAOSTAT, own computation

Table 3: Harvested area for poppy.

Yield (t/Ha)	item	1961	1971	1981	1991	1993	2001	2007	2009	Average	Standard Deviation	
Austria	Poppy seed	0.91	0.95	1.02	1.03	0.97	0.86	0.74	0.688	0.92	0.09	9.30%
Germany	Poppy seed	0.62	0.64	0.54	0.71	0.7	0.68	0.74	0.6235	0.66	0.07	10.20%
Czech Republic	Poppy seed	0	0	0	0	0.78	0.62	0.58	0.6096	0.65	0.09	14.40%
Hungary	Poppy seed	0.36	0.51	0.47	0.59	0.69	0.74	0.7	0.8803	0.54	0.14	25.70%
World	Poppy seed	0.52	0.75	0.53	0.78	0.69	0.57	0.56	0.7032	0.62	0.08	13.20%
Slovakia	Poppy seed	0	0	0	0	0.58	0.48	0.3	0.4369	0.48	0.09	18.90%
France	Poppy seed	1.02	0.63	0.4	0.44	0.5	0.43	0.53	0.65	0.54	0.13	24.70%
Turkey	Poppy seed	0.48	1.05	0.75	0.83	0.44	0.47	0.37	0.6993	0.6	0.15	24.70%
Romania	Poppy seed	0.49	0.31	0.1	0.86	0.5	0.72	0.52	0.5943	0.58	0.29	49.70%
Czechoslovakia	Poppy seed	0.64	0.75	0.36	0.79	0	0	0	0	N/A	N/A	N/A

Source: FAOSTAT, own computation

Table 4: Development of hectare yields in chosen regions.

hectares to almost 100 thousands hectares. Standard deviation of harvested areas range from average for the EU27 in the period was around 48%. In case of the CR it was for example 70%, then even in France 78%, Turkey 60%, 41% in Hungary, etc. A very important factor affecting the level of supply poppy seed is yield per hectare (Table 4). Although the potential poppy yields are estimated at levels from 1.8 to 2.9 t/ha, real yields are on average much lower. In the period 1961-2009, the average yield remained at a level of about 0.48 to 0.92 t/ha, depending on the region. The highest yields of long reaches of Austria, the lowest in France, Turkey and Romania in the CR then on average between 0.6 to 0.7 t/ha. It should be noted however that the yield per hectare is very unstable over time. Standard deviation is in the range of about 13% of the average annual production in the world. From the introduced regions, the ones with highest volatility are Romania (49%), Turkey (24%), France (24%) and Hungary (25%).

The development of foreign trade in poppy seed

Poppy share of world agri-trade is about 0.02%. In the period 1961-2009 the volume and value of world exports of poppy seeds significantly increased, whereas the main growth was recorded in the period 2000-2007. During the period 2008 and 2009, the decrease in trade value and volume was recorded. The value of exports grew at an average annual rate of 13% and in 2007 reached some 213 million USD. The volume of exports grew by about 6.6% per year and in 2007 reached

some 92 thousand tons. Details about the value and volume of world exports are included in Table 5 or Table 6.

However, it is worth mentioning that in the years 2008-2009, due to the interplay of several factors (high reserves, bad weather, poor production quality, etc.) the value of world trade in poppy seeds diminished to the value of approximately 142 million USD in 2009. In the Table below, countries that control more than 95% of the value of world exports of poppy seed.

Over the long-run, most of the value involved in poppy trade is in the following countries Czech Republic, Turkey and the Netherlands. Share of these countries in world exports reached only in 2009 about 70%. The Czech Republic and Turkey which are also the countries with the highest level of comparative advantage in world trade in poppy seed (see RCA1 value index - Table 7). The countries that achieve long-term comparative advantage in terms of world trade in poppy seed are: CR, Turkey, Netherlands, Austria, Poland, Hungary, Australia, Slovenia and Bulgaria. If we look at the results of the analysis in terms of both the value of the exports, and in terms of index values RCA1 we clearly see huge differences.

Export Value (1000 \$)	1993	1995	1997	1999	2001	2003	2005	2007	2009	Share in trade 2009	Rate of growth 1993-2009
World	38733	45524	48437	56280	46284	67045	102363	212913	142 723		1.129447
Czech Republic	7971	13734	8535	12822	10354	11714	31728	88184	39 458	28%	1.187306
Netherlands	10361	6082	7251	3844	5923	9383	17496	44456	47 493	33%	1.109636
Turkey	7754	10174	17189	22149	19035	32290	28609	35266	16 224	11%	1.114263
Australia	3845	5350	4351	4931	3683	5257	5828	7160	4 775	3%	1.01201
Austria	166	553	460	671	739	1070	2607	6667	9 729	7%	1.267878
Poland		373	1255	562	1108	0	3629	5958	1 890	1%	1.237856
Spain	1387	165	221	225	102	2	1153	5084	5 754	4%	1.097223
Germany	1127	577	2336	1665	1144	1152	888	3444	1 890	1%	1.089878
United Kingdom	38	58	85	56	62	214	2021	2310	2 512	2%	1.340962
Indonesia	0	0	0	0	1	217	3	2292	x	x	0.680942
France	1910	1193	3114	1950	1224	2017	3360	2210	1 866	1%	1.010475
Hungary	645	519	241	136	349	690	0	2019	992	1%	0.991951
Ethiopia						52	0	1120	x	x	x
China		24	15		28	409	370	948	1 345	1%	1.204582
Belgium					229	303	501	725	473	0%	1.072255
USA	95	292	136	90	135	206	269	553	683	0%	1.134078
Lithuania		761	316	85	65	106	469	503	260	0%	1.169765
Bulgaria	0	50	0	0	0	5	0	460	616	0%	x
India	63	68	72	66	136	120	308	406	607	0%	1.083875
Slovakia	350	837	98	105	20	208	568	378			0.945531

Source: FAOSTAT, own computation

Table 5: Geographical structure of world exports in USD.

Export Quantity (tonnes)	item	1993	1995	1999	2003	2005	2007	2009	Share in trade 2009	Rate of growth 1993-2009	Rate of growth 1993-2009
World	Poppy seed	37588	46185	70704	75229	78514	92367	69 212		1.066327	1.129447
Czech Republic	Poppy seed	5386	15977	20220	13148	28167	30321	30 697	44%	1.131372	1.187306
Turkey	Poppy seed	4995	10016	23672	34480	14647	14934	14 008	20%	1.08137	1.109636
Netherlands	Poppy seed	10285	4122	3845	9394	10643	13762	3 498	5%	1.02102	1.114263
Indonesia	Poppy seed	0	0	1	217	7	8530	x	x	1.149117	1.01201
Spain	Poppy seed	1612	294	345	5	3848	5523	2 697	4%	1.371023	1.267878
Australia	Poppy seed	5654	4432	6383	7248	4728	3611	2 895	4%	0.96848	1.237856
France	Poppy seed	3220	1244	5384	5223	4062	3390	1 991	3%	1.003682	1.097223
Poland	Poppy seed		216	372	0	4181	3068	909	1%	1.392511	1.089878
Austria	Poppy seed	68	116	448	645	2847	1784	4 243	6%	1.262842	1.340962
Ethiopia	Poppy seed				114	0	1316	x	x	1	0.680942
Germany	Poppy seed	711	375	1180	1096	592	1039	1 206	2%	1.027466	1.010475
United Kingdom	Poppy seed	23	33	23	183	1465	1008	1 428	2%	1.309986	0.991951
Hungary	Poppy seed	650	449	120	908	0	861	627	1%	0.981434	x
China	Poppy seed		29		620	440	781	878	1%	1.116337	1.204582
USA	Poppy seed	118	291	135	258	175	501	773	1%	1.108802	1.072255
India	Poppy seed	18	33	25	105	241	325	215	0%	1.229583	1.134078
Belgium	Poppy seed				220	355	219	238	0%	0.983612	1.169765
Sri Lanka	Poppy seed				0	0	209	0	0%	1.002436	x
Bulgaria	Poppy seed	0	20	0	10	0	194	314	0%	1.26203	1.083875
Lithuania	Poppy seed		309	76	104	340	162	154	0%	0.984361	0.945531

Source: FAOSTAT, own computation

Table 6: Geographical structure of world exports in tonnes.

Export	RCA1	Export	RCA1
Czech Republic	75.32917	Slovakia	0.739075
Turkey	22.19027	Spain	0.673794
Ethiopia	4.48642	Indonesia	0.533664
Netherlands	2.705371	United Kingdom	0.415634
Austria	2.59023	Sweden	0.290929
Poland	1.912268	Germany	0.246495
Hungary	1.3904	Ukraine	0.221892
Australia	1.246591	France	0.154679
Slovenia	1.173791	China	0.140626
Bulgaria	1.156158	India	0.099786
Latvia	0.901334	Belgium	0.085782
Lithuania	0.780982	Denmark	0.085468
Sri Lanka	0.74296	United States of America	0.024561

Source: FAOSTAT, own computation

Table 7: Geographical structure of world trade in poppy seed in 2004-2008 (i.e., in the period before the crisis of the world economy).

The Czech Republic, Turkey and the Netherlands are the main pillars of world trade in poppy seed. In the period 1993-2009 the proportion of those countries in world trade fluctuated between 65-80%. In the period despite a decline in the years 2008 and 2009, clearly the highest level of growth dynamics of the value of exports can be attributed to the Czech Republic valued at approximately 19% per year. In the case of the Netherlands and Turkey, the growth rate is slightly below 11% per year (calculation of growth rates of trading volume are negatively affected by fluctuations USD exchange rate). An interesting feature of world trade in poppy seed is the development of prices. This analysis reveals very significant differences in export unit prices for individual countries and territories. For example, whereas in 2009, the Netherlands exports are around \$ 4.7/kg, France exports poppy seed at \$ 0.94 per kilogram. Volatility of poppy seed poses a major problem for the stability of market and trade.

The Table 8 clearly shows a high proportion of the average value of deviations from the average price per kilogram in 1993-2007 for all selected countries. Already in the period before the crisis, it was quite obvious that the kilogram poppy prices are very volatile. Unstable export prices can be observed especially in the case of Slovakia, Spain, India and the Czech Republic. On the contrary, the most stable prices can be found in Germany, the USA and Turkey. The following Table 9 provides data on the kilogram prices of exports and imports

of those countries which act as major exporters, importers and also poppy seed in the world.

As stated above both export prices and import and poppy seed oscillate dramatically. For individual unit prices of selected countries, exports oscillate on average in the range of about 24 to 40%. In the case of imports for each selected country average prices oscillate between 26 to 36%. It is interesting to see how individual exporters while comparing their prices with world prices. While countries are very much involved in business operations (the Netherlands, Poland, Austria, Germany), the realized export price is above the average world prices. Countries like Australia and the Czech Republic are dominant players in the field of production and trade. Poppy is on average traded at a price lower than the world average and also ranks among the countries whose rates oscillate kilogram most. It is then interesting to note that while the Czech Republic and Australia for the import of poppy seed have their own import prices far above the average realized prices of imports in the world. All countries which are re-exporting are able to buy poppy seed at prices significantly lower (often at a price that is below the world price), than for what it is then exported to the world market. This implies that these countries are highly skilled traders and are able to handle the market better than is the case of the Czech Republic.

Unit price – export USD/kg	1993	1995	1997	1999	2001	2003	2005	2007	2009	Average Price	Standard Deviation	Standard Deviation Share on Price
Slovakia	1.44	0.98	1.31	0.95	0.91	1.17	2.41	4.67	2.38	1.61	0.81	50.16%
Austria	2.44	4.77	1.71	1.5	1.3	1.66	0.92	3.74	2.29	2.07	0.76	36.72%
Germany	1.59	1.54	1.42	1.41	1.32	1.05	1.5	3.31	2.18	1.62	0.38	23.73%
Denmark	1.6	1.34	1.11	1.61	1.17	1.93	2.77	3.24	2.46	1.75	0.56	32.18%
Netherlands	1.01	1.48	1.23	1	0.97	1	1.64	3.23	4.64	1.36	0.4	29.38%
Czech Republic	1.48	0.86	0.79	0.63	0.68	0.89	1.13	2.91	1.29	1.03	0.4	38.57%
Turkey	1.55	1.02	1.08	0.94	0.76	0.94	1.95	2.36	3.39	1.27	0.36	28.37%
World	1.03	0.99	0.99	0.8	0.74	0.89	1.3	2.31	2.06	1.08	0.27	24.71%
United Kingdom	1.65	1.76	2.58	2.43	2.14	1.17	1.38	2.29	1.76	1.95	0.45	22.97%
Australia	0.68	1.21	0.9	0.77	0.83	0.73	1.23	1.98	1.65	1.02	0.32	31.82%
Poland	2	1.73	2.03	1.51	0.27	1	0.87	1.94	2.08	1.52	0.54	35.35%
India	3.5	2.06	2.18	2.64	1.37	1.14	1.28	1.25	2.82	1.89	0.74	39.02%
United States of America	0.81	1	0.74	0.67	1.09	0.8	1.54	1.1	0.88	0.98	0.23	23.38%
Spain	0.86	0.56	1.03	0.65	0.84	0.4	0.3	0.92	2.13	0.95	0.38	40.30%
France	0.59	0.96	0.62	0.36	0.34	0.39	0.83	0.65	0.94	0.64	0.24	36.87%

Source: FAOSTAT, own computation

Table 8: Kilogram price of poppy seed exports.

Unit price – export USD/kg	1993	1995	1997	1999	2001	2003	2005	2007	2009	Average Price	Standard Deviation	Standard Deviation Share on Price
Czech Republic	1.48	0.86	0.79	0.63	0.68	0.89	1.13	2.91	1.29	1.03	0.4	38.57%
Netherlands	1.01	1.48	1.23	1	0.97	1	1.64	3.23	4.64	1.36	0.4	29.38%
Germany	1.59	1.54	1.42	1.41	1.32	1.05	1.5	3.31	2.18	1.62	0.38	23.73%
Australia	0.68	1.21	0.9	0.77	0.83	0.73	1.23	1.98	1.65	1.02	0.32	31.82%
Austria	2.44	4.77	1.71	1.5	1.3	1.66	0.92	3.74	2.29	2.07	0.76	36.72%
Poland	2	1.73	2.03	1.51	0.27	1	0.87	1.94	2.08	1.52	0.54	35.35%
Turkey	1.55	1.02	1.08	0.94	0.76	0.94	1.95	2.36	3.39	1.27	0.36	28.37%
World	1.03	0.99	0.99	0.8	0.74	0.89	1.3	2.31	2.06	1.08	0.27	24.71%
Unit price – import USD/kg	1993	1995	1997	1999	2001	2003	2005	2007	2009	Average Price	Standard Deviation	Standard Deviation Share on Price
Czech Republic	1.23	1.55	0.67	0.82	0.92	1.06	1.65	2.78	1.59	1.29	0.43	33.20%
Netherlands	1.2	0.94	0.57	0.58	0.52	0.56	0.76	2	3.85	0.86	0.31	36.26%
Germany	1.57	1.15	1.05	0.93	0.87	0.94	1.4	2.79	1.92	1.3	0.4	30.39%
Australia	1.57	1.68	0.9	1.11	0.95	2	1.67	2.77	2.16	1.39	0.45	32.29%
Austria	1.31	1.1	1.01	0.86	0.89	0.99	1.26	3.07	1.46	1.24	0.4	32.02%
Poland	0.84	0.43	0.7	0.63	0.65	0.77	1.03	2.42	1.27	0.9	0.31	33.89%

Source: FAOSTAT, own computation

Table 9: Unit prices of export and import of poppy seeds in the world and selected countries.

Analysis of value, volume and territorial structure of world import poppy seeds

While the territorial structure of exports is relatively very closely concentrated, the territorial structure of imports is much less concentrated. The main importers while also include a limited number of countries, are no longer as dominant as in the case study of export markets. The share of the twenty most important importers of world import value is about 90%. The most important importers of poppy seeds in the world include Germany, Russia, Netherlands, Poland, Austria, India and the US. Share of these seven countries in the world is importing more than 70% of total inflow of poppy seed. Among the importers with the highest import growth dynamics belong in particular Romania, Russia, the Czech Republic, India, Great Britain, Austria, Ukraine, Poland and the Netherlands. In this regard it should be noted that the list is dominated by a number of countries which are also exporters of poppy seeds and the production is not in par with their level of exports. This is evident in the case of the Netherlands. Therefore, it should be noted that the poppy trade is greatly influenced by

re-exports. Effect of re-exports is the most obvious case that is happening in the Netherlands as well as in the case of Austria, Poland and others. Detailed information on the evolution of territorial structures and values of world import of poppy seeds can be found in the following Tables No. 10 and No. 11.

Recent developments in the market with poppy seeds

The market for poppy is characterized by a very turbulent environment, as demonstrated above by the data summarizing the development in the world market as well as in the Czech market with poppy in 1961-2009 respectively in the period 1993-2009. In recent years (2009, 2010 and the first half of 2011), significant changes in the world emerged. To the forefront of production and trade new countries emerged and other countries have lost their positions. Among the fastest growing producers belong undoubtedly Asian countries especially Turkey. On the contrary, the countries of Central and Eastern Europe as producers in recent years considerably lose their position. This is especially

Import Value (1000 \$)	1993	1995	1997	1999	2001	2003	2005	2007	2009	Average
World	39897	42531	43323	54894	44793	61483	83457	174543	132825	1.111176
Germany	11874	8578	8519	9140	7620	6820	10126	26418	15926	1.058784
Russian Federation	214	5000	4000	1336	3762	6346	9514	24898	12090	1.404603
Netherlands	4696	5050	3336	4058	2930	4585	6994	16319	12014	1.093051
Poland	3700	2286	6692	7447	8487	8635	11304	16095	8450	1.110725
Austria	2152	1765	1286	2625	2265	3745	4853	16032	12327	1.15424
India	1239	918	525	3953	472	7309	5362	12733	30588	1.18107
United States of America	5717	8058	6553	6384	4698	4784	6621	10842	6918	1.046774
United Kingdom	885	1164	625	446	626	833	2423	7938	2907	1.169647
Denmark	2043	1780	1285	1983	1487	1897	2864	6771	3693	1.089357
Czech Republic	385	200	574	734	1474	841	1166	4639	2652	1.25178
Belarus				765	654	169	1233	3543	1801	1.061616
Slovakia	86	3	1232	909	1321	1862	1599	3331	1891	1.068294
Ukraine					500	77	2675	2703	478	1.128102
France	1857	381	258	332	456	474	884	2113	1718	1.037766
Romania	9	31	148	186	270	505	1334	1871	775	1.464062
Canada	675	1055	817	971	769	654	1057	1785	2111	1.071931
Lithuania		418	868	495	465	437	823	1687	810	1.06409
Croatia	313	415	279	356	331	559	634	1262	594	1.056067
Sweden	686	1290	883	1224	1251	1695	2549	1201	1521	0.967954
Israel	651	660	404	485	486	361	441	1168	1026	1.042637

Source: FAOSTAT, own computation

Table 10: Geographical structure of world imports in USD.

Import Quantity (tonnes)	1993	1995	1997	1999	2001	2003	2005	2007	2009	Average
World	35359	42267	52134	86311	61608	77698	86049	82830	62001	1.062689
Russian Federation	99	2900	5800	2400	8387	13177	16408	14668	4841	1.429067
Germany	7560	7469	8124	9805	8762	7223	7212	9460	8299	1.016143
Pakistan	392	1025	4101	2807	2091	3097	5235	8534	x	1.246126
Netherlands	3929	5365	5879	6938	5659	8137	9258	8162	3117	1.053609
India	3525	2093	1231	4468	477	9089	6506	6888	10358	1.049013
Poland	4391	5303	9567	11820	13158	11206	11020	6660	6649	1.030202
United States of America	5162	6122	5238	6192	4742	5021	4926	5497	3901	1.004501
Austria	1640	1608	1274	3059	2544	3787	3850	5220	8429	1.086216
United Kingdom	680	883	569	430	699	883	1828	3318	2059	1.119874
Denmark	1786	1620	1425	1792	1768	1492	1329	1867	1386	1.003173
Czech Republic	312	129	852	899	1608	796	707	1670	1672	1.200709
Ukraine					402	76	2685	1360	280	1.090958
Belarus				418	606	169	932	1094	794	1.036756
Slovakia	56	1	912	1253	1610	1773	1026	846	963	0.746104
France	1505	257	178	319	778	416	845	726	522	0.949261
Canada	711	1146	870	1155	1010	865	875	673	1032	0.996084
Romania	4	18	283	384	665	891	1120	649	504	1.438369
Lithuania		326	604	542	567	479	672	587	544	1.059892
Kazakhstan		56			150	311	427	485	369	1.154329
Israel	600	700	380	450	607	410	310	428	580	0.97616

Source: FAOSTAT, own computation

Table 11: Geographical structure of world imports in tones.

true for the Czech Republic region, where only a year on year 2008-2009, there was a decline in production by about 34% and subsequently in 2009-2010, the decline continued. In recent years, especially the European market with poppy seeds stagnated. This is due to fluctuations in prices and in particular, in general, low purchase price of the poppy. Then, there is a problem in an ever-tightening legislation significantly affecting the size and especially the economy of growing poppy seed. Finally, it negatively impacts the high stock levels. Its influence has also generally decreasing demand for food in a traditional bastion of consumption, which is Central and Eastern Europe. The poppy is also under strong competitive pressure from Asian poppy, where the production is not regulated like in Europe.

Conclusions

Poppy seed is a very interesting complement to the global agricultural market. Although its share of world agricultural production and trade

is negligible, the poppy seed market character is very interesting. It is one of the few crops that are produced within the relatively narrow group of countries, which then supply their production of the world. For example, in 2009 the volume of world production of poppy seed reached some 100 thousand tons and the volume of world trade was moving at about 70 thousand tons (the volume of trade was affected by stocks from previous years). However, the majority of the production of poppy seed is not consumed in the country of origin, but is realized on the world market. As for the balance of Czech production and subsequent use of poppy seed in the Czech Republic, it is clear that the Czech Republic in recent years greatly increased the level of production, which increased from about 17 thousand tons to about 50 thousand tons. In addition to output growth, also growth in exports has been noted, which rose over the same period from about 15 thousand tons to about 30 thousand tons. Imports also rose in this period and were rising at about 2 thousand tons per year. Given that the Czech industry annually consumes about 5

thousand tons of seed, it means that in 2002-2009, the Czech Republic began to accumulate significant reserves. During this period, inventory levels increased from 140 tons to about 16 thousand tons. This situation, which was typical not only for the Czech market has resulted in the rapid decline in poppy seed prices in the domestic market but also in the world market. World production and trade of poppy seed in time greatly oscillated, which has a very negative impact on market stability. Prices of both exports and imports for each country are changing very often in both directions. World production is greatly influenced by fluctuating poppy seed yields, which were far below the potential production of this crop. World production is greatly influenced mainly by the price level from the previous period and the stock. Low prices then tend to occur in lower sowing areas, which also happened in 2009 and, for example in the Czech Republic; sown area was reduced from 70 thousand to about 53 thousand hectares.

Currently, world production and trade are controlled by a very narrow group of countries. In case of production dominant share have the Czech Republic, Turkey, Tasmania, France, Hungary and Germany. In the case of trade the dominant position can be attributed to the CR, the Netherlands and Turkey. Based on the above it is necessary to emphasize the position of the CR, which controls about 33% of world production and about 28% of the value and about 44% of world trade in poppy seed. It therefore follows that the Czech Republic belongs to the most important players. However, the Czech Republic has only limited influence on the world market. Czech exports are realized below the world price. Currently there are difficulties to sell their output because of a stagnant world market and mainly also due to high stocks from previous years.

Processed data show that the level of production is directly dependent on the size of a poppy seed crop area and yield per hectare. Results show a degree

of dependence between harvest areas and declared prices of exports from the previous period. This can be expected in the coming years when poppy production in the Czech Republic decreases. Lost production will then be compensated by high levels of the stocks that are currently moving according to Ministry of Agriculture at more than 10 thousand tons. As for the Czech exports, in terms of the volume, it shows a high degree of dependence on the volume of world exports (the result is influenced by the fact that the Czech Republic numbers come from a significant percentage of the volume of poppy, which is traded in the world).

Regarding the current situation, we can say that mass production technology used, high quality poppy seeds, minimal damage to the seeds, the minimum content of impurities, uniform color, size of lots, sales culture, promotion of Czech production, enabled Czech businessmen to penetrate heavily foreign markets. All of that together with crop failures and a decline in poppy sown area in Turkey, Oceania and other countries have strengthened the Czech position on the world market. Growing poppy was profitable despite falling commodity prices on world markets. In the long term, average exports from CR account for 80-90% of production. Due to the high supply, which currently exists in the world market, price fell down. In the future it is expected that the Czech Republic will continue to maintain its privileged position on the world market, but there is a certain reduction in production, which is already evident because if we compare harvested area between the 2008/2009 and 2009/2010 we find that it dropped from about 70 thousand hectares to about 51 thousand hectares.

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