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# COMPARATIVE ISSUES ON THE EVOLUTION OF POTATO-GROWING AREAS AND OF CROPS OBTAINED IN ROMANIA AND IN OTHER EUROPEAN COUNTRIES

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**Summary:** *This paper represents an analysis of the way in which the potato-growing areas and the European production have evolved, compared to the situation existent in Romania. The international situation is also mentioned, taking into account the special importance of potato in the diet of people in different areas of the Earth. The period between 2007 and 2012 is analysed, with a special focus on the situation existent in 2012 and with references to the global situation, as it was mentioned before. For Romania, the period from 1938 to 2012 is analysed, taking into account the high consumption of potatoes that, for Romanian, is practically "another bread". Although, at the European level, these areas are decreasing, potato continues to have a special importance in the diet of people from many countries, some of them reaching remarkable productions: the Netherlands, Germany, and Poland.*

**Key words:** *cultivated areas, consumption, productions, tubers, producers*

## INTRODUCTION

Due to its nutritional value and chemical composition, potato has a particular importance in human alimentation. Besides it can be used in animals' diet, it has several uses in industry also. The phytotechnical importance of this plant has to be also taken into account.

Originating in South America, potato has spread and it is now cultivated on all the continents, being present in 183 countries, according to FAO. It is found from the Northern areas, where barley is barely grown, being also present in Greenland, to Northern Africa or in equatorial areas, at considerable heights.

The large spreading area of potato may be explained, on the one hand by its importance in relation with the people's diet, and, on the other hand, by its physiological features, meaning tubers may be kept in special storage areas for a long period of time from their harvesting.

Although the date supplied by FAO indicate that, at the international level, potato-growing areas are steady around the figure of 18-19 million ha, they have continued to and its consumption is still high in many areas of the world.

## MATERIAL AND METHOD

In the European developed countries, with a high degree of technology in agriculture, the potato-growing areas have decreased considerably in the last years, but, the yields per hectare have increased. It is also the case of the Netherlands that grows potatoes on approximately 25 % of the agricultural land and has yields of 45 tons per hectare. This country is an important producer and supplier of certified potato seeds at the international level. Examples may continue with Germany, Poland etc. The data that were analysed and interpreted in this document were supplied by FAO and the Romanian National Statistics Institute. The conclusions at the end of this article are also based on the interpretation of the statistical data provided by these sources.

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## RESULTS AND DISCUSSIONS

Roots have been traditionally at the base of food consumption in general, in many countries with a low level of consumption, and, especially in Sub-Saharan Africa and in Latin America and Caribbean. The changes in the production of these crops represented an important factor in the changes of the national average of food consumption.

Table 1. Distribution of potato-growing areas by geographical areas

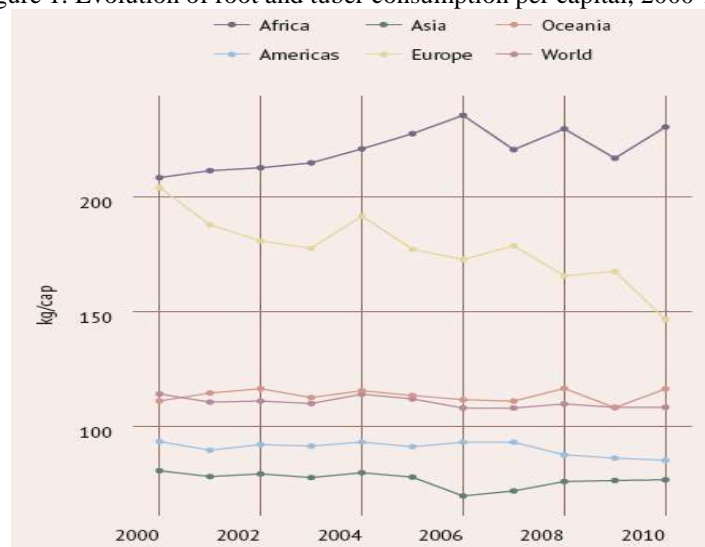
Geographical area	Area, thousand ha		
	1999	2000	2010
Europe (35 countries)	9,162.2	9,144.2	6,100.3
North America	694.8	702.5	544.9
Latin America & Caribbean	1009.9	1092.9	926.7
Africa	901.6	896.3	1808.3
Asia	7,094.3	6,856.6	9,183.6
Oceania	55.3	55.3	47.3
<b>Global total</b>	<b>19,099.6</b>	<b>18,764.5</b>	<b>18,693.6</b>

Thus, several types of products within the group of roots show divergent trends as regards production, in different regions, with a different economic status.

For example, in Europe, potato production per capita has had a long time decline, while the production in Africa and Asia has registered an important increase in the last decade, although is started from a smaller base.

On the other hand, sweet potatoes have registered a swift decline: The production per capita is now a third of that at the end of 1970, a trend that reflects a rapid decrease of the demand of sweet potatoes in China, especially as animal feeding (Figure 1).

Figure 1. Evolution of root and tuber consumption per capital, 2000-2010



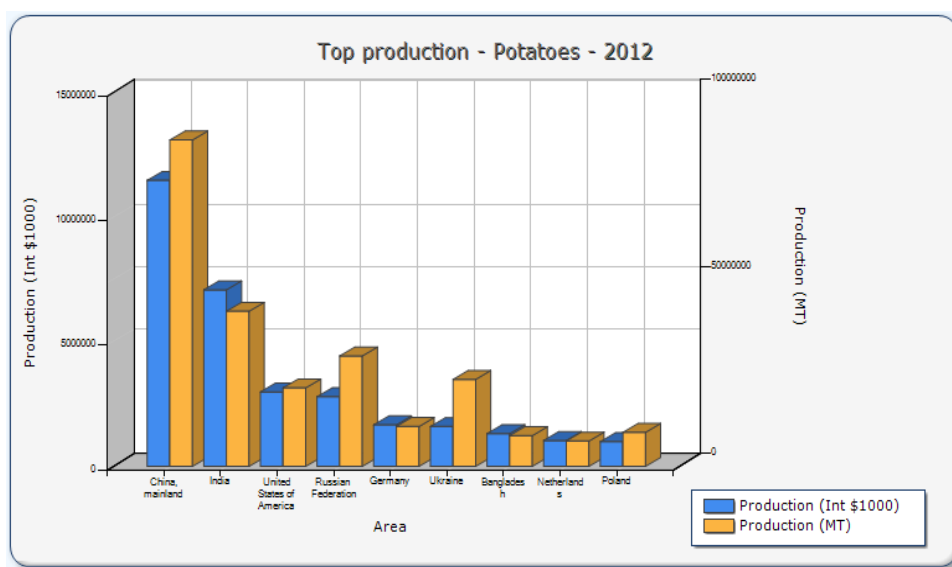
The situation in the large potato-growing countries is shown in Table 2.

Table 2. Large potato-growing country in the world

	Area, thousand ha			Average production, t/ha			Total production, thousand t		
	1999	2000	2010	1999	2000	2010	1999	2000	2010
Russian Federation	3,226.7	3,250.0	2,109.1	9.7	10.0	10.0	31,343.85	29,532.53	21,140.54
China	4,065.9	3,801.9	5,207.5	13.8	16.3	15.6	56,141.09	87,260.00	81,594.18
Poland	1,267.8	1,200.0	490.8	15.7	18.9	17.8	19,926.71	9,091.90	8,765.95
Ukraine	1,551.1	1,560.0	1411.9	8.2	8.3	13.2	12,723.00	23,250.20	18,705.00
Germany	309.0	304.3	255.2	38.9	41.8	39.9	12,031.20	10,665.60	10,201.90
USA	539.2	546.9	405.0	40.2	42.7	45.2	21,691.50	20,990.73	18,337.53
the Netherlands	183.0	183.0	156.9	46.2	44.8	43.5	8,331.00	6,765.61	6,843.52
United Kingdom	177.6	166.0	138.0	40.1	39.9	43.8	7,130.90	6,636.00	6,056.00

FAO data for the last years indicate that the global potato-growing area is steady at 18-19 million ha (19.3 million ha in 2007, out of which 7.4 million ha in Europe). It has to be also noted that, in 1965, the area exceeded 23 million ha, out of which 16 million ha were cultivated in Europe and USSR (70 % of the global areas). During that year, Germany (DRG and FRG) cultivated 1.5 million ha (compared to 302 thousand in 2000 and 255 thousand in 2010), and Poland 2.8 million ha (compared to 491 thousand ha in 2010), (Table 2).

Figure 2. The largest potato producers, at international level, in 2012



Analysing the evolution of potato-growing areas that registered, according to the data submitted by FAO, a significant decrease, especially among the European Union countries, it can be considered that one of the causes could be the spectacular increase of the yield per ha, and a second possible cause could be the development of a food industry that offers value to the processed potato. The fact that potato was replaced with cereals in animal feeding has to be taken into account also.

It has to be also noted that, while at the European Union level, a decrease of potato-growing areas was registered, an increase of the production/ha was also registered, especially in the countries with a technology based agriculture, and also in countries such as Poland, where the agriculture was supported after accession. The situation is shown in the next table.

Table 3. Evolution of potato production in several European countries, large potato-producers

Country	Cultivated areas Thousand ha			Total production Thousand t			Average production T/ha		
	2007	2010	2012	2007	2010	2012	2007	2010	2012
<b>Poland</b>	569.60	490.85	373.00	11,791.07	8,765.95	9,091.90	20.7	17.8	24.3
<b>Germany</b>	274.96	255.20	238.30	11,643.76	10,201.90	10,665.60	42.3	39.9	44.7
<b>The Netherlands</b>	161.00	156.96	149.77	7,200.00	6,843.52	6,765.61	44.7	43.5	45.1
<b>France</b>	145.00	157.08	154.22	6,271.00	6,622.04	6,340.80	43.2	42.1	41.1
<b>Great Britain</b>	139.00	138.00	149.00	5,635.00	6,066.00	4,553.00	40.5	43.9	30.5
<b>Romania</b>	267.03	246.98	229.05	3,705.69	4,003.98	2,465.15	13.9	16.2	10.7
<b>Belgium</b>	68.10	81.76	64.50	2,877.68	3,455.80	2,929.80	42.3	42.2	45.4
<b>Spain</b>	89.00	79.16	73.90	2,502.30	2,326.65	2,168.80	28.1	29.3	29.3
<b>Italy</b>	71.96	62.40	61.00	1,837.84	1,558.03	1,597.80	25.5	24.9	26.1
<b>Denmark</b>	41.20	38.50	39.50	1,625.60	1,357.80	1,664.20	39.5	35.2	42.1
<b>Ireland</b>	12.30	12.20	9.00	454.80	419.68	232.00	37.0	34.4	25.7

In 1970, Poland was the country that obtained more than 50 million ton of potatoes/year, at that time being outrun only by the Soviet Union. Today, Poland is still among the top 10 producers in the world. However, the yield has decreased in the last years, from 36 million ton in 1990 to 24.2 million ton in 2000, and then, it dropped to a minimum of less than 9 million ton in 2006. In 2007, the yield of approximately 11.8 million ton was a starting point for the recovery of production in Poland. Potato still remains very important for the Polish agriculture. Recent forecasts indicate that almost a half of the potato yield is used as fodder in farms, and 25 % are for human consumption.

At one century from their entry in the Netherlands, in 1600, potatoes were one of the most important crops in the agricultural farming of this country. Today, the Netherlands is in the top 10 potato producers of the world, with a yield in 2007 of 7.2 million ton (6.7 million ton in 2012).

While potato production is still decreasing in most part of Europe, the Dutch still cultivate potatoes on almost 25 % of their arable land and, at international level, they have reached the average yields of more than 45 ton per hectare. The potato production field is highly mechanized, approximately 250 certified varieties being cultivated.

Only half of the potato harvest in the Netherlands is used for the direct food consumption. Approximately 20 % represent potatoes for seeds, and the rest of 30 % are processed for starch. Approximately 70 % of the Dutch potatoes are exported as tubers and potato products, such as chips and powder. The Netherlands is an important international supplier of certified potatoes for seeds, the exports exceeding 700,000 ton per year.

Germany is the seventh larger producer of potatoes of the world and the largest in the Western Europe, with yields of more than 11.6 million ton in 2007. Even so, in 1960, potato production in Germany has registered a decrease; the crop was of approximately 33 million ton, with an increased farmed area, of 10 % of the total arable lands, compared to less than three percentages today.

Germany is an important processor and exporter of potatoes. For example, in 2005, it has processed 6.5 million ton of potatoes, including 3.3 million ton transformed in starch and has exported 1.3 million ton of fresh potatoes and 2 million ton of processed products. It is also a top importer of early potatoes (almost 500,000 ton, the largest part of France, Italy and Egypt, in 2005).

In France, the potato has registered ups and downs, from its introduction into the diet at the end of the 18<sup>th</sup> century, when A. A. Parmentier has recommended it as the solution to the endemic hunger ravaging the country and until today. The production was at its peak in 1960, with a yield of almost 14 million ton. Since then, it has decreased constantly, the yield in 2007 being of only 6.3 million ton. 2 million ton of the potatoes grown in France are for the domestic market, fresh, and one million ton for the processing industry. France is the No. 1 exporter of fresh potatoes, with almost 1.5 million ton in 2005/2006 and it grows 14,500 ha for the production of tubers for seeds.

Potatoes still have an important role in the national diet: French eat almost 30 kg of fresh potatoes and 25 kg of processed products per year per capita.

Among the large potato producers in Europe, the following are to be mentioned: Russian Federation and Ukraine, with farmed areas of 2.1 million ha and 1.4 million ha respectively, in 2012. The biggest potato consumer is Belarus, with 185.2 kg per capita.

As regards the direct consumption of potatoes, it ranges from 13.9 kg per year in Africa to 87.8 kg in Europe (Table 4).

Table 4. Potato consumption per region, in 2007

Area	Population	Total production (t)	kg per capita
Africa	904 388 000	12 571 000	13.9
Asia/Oceania	3 934 644 000	94 038 000	23.9
Europe	739 203 000	64 902 000	87.8
Latin America	562 270 000	11 639 000	20.7
North America	330 400 000	19 824 000	60.0
<b>Total consumption</b>	<b>6 484 792 000</b>	<b>202 974 000</b>	<b>31.3</b>

In Europe, the biggest consumers are Belarusians, with 185.2 kg, while the Romanians eat only 99.3 kg of potatoes/per capita yearly.

For many countries, including Romania, potato is “another bread”, the tubers being used directly in the diet, or as semi-processed food.

Table 5. Evolution of potato consumption per capita, in Europe, during the period 2008-2011

European country	MU	2008	2009	2010	2011
Austria	kg	57.2	57.4	56.8	58.3
Belarus	kg	193.2	185.8	185.2	185.2
Belgium	kg	85.2	82.6	84.3	105.9
Bosnia and Herzegovina	kg	76.2	75.9	76.4	75
Bulgaria	kg	40	33.3	31.3	31.1
Croatia	kg	61.4	63.4	47.1	42.3
Czech Republic	kg	68.7	65.7	62.2	66.2
Denmark	kg	74.6	75.8	58.9	59.7
Switzerland	kg	38.8	37.3	35.8	34.9
Estonia	kg	85.3	100.6	111.3	114
Finland	kg	68.5	66.7	67	66.7
France	kg	57.5	52.8	56.1	54.5
Germany	kg	69.8	70.3	62.1	70.7
Greece	kg	69.9	72.8	64.8	65.4
Ireland	kg	96.6	92.7	92.5	90.1
Italy	kg	37.4	39.7	39.9	38.5
Latvia	kg	111.2	112.2	93.5	92.6
Lithuania	kg	98.4	104.3	96.2	102
Luxembourg	kg	45.2	42	61.7	61.3
Macedonia	kg	56.2	63.5	59.3	57.5
Malta	kg	69	56.2	63.7	60.8
Great Britain	kg	52.6	53.7	53.3	55.6
Moldova	kg	58.2	59.2	57.3	60.3

Montenegro	kg	45	47.4	47.4	47.5
Norway	kg	67.2	60	57.5	55.5
the Netherlands	kg	91.7	89.9	92.5	93.9
Poland	kg	119.3	117.2	112.7	114.7
Portugal	kg	75.6	61.7	60.4	58.2
<b>Romania</b>	<b>kg</b>	<b>99.9</b>	<b>94.2</b>	<b>99.1</b>	<b>99.3</b>
Russia	kg	112.3	113	105.1	111.5
Serbia	kg	37.6	38.8	39.1	39.6
Slovakia	kg	54.1	53.5	53.4	52.7
Slovenia	kg	32.2	28.7	32.3	33.1
Spain	kg	58.5	58.1	57.2	58.4
Sweden	kg	43.1	43.9	43.4	41.8
Ukraine	kg	104.9	104.4	99.1	100.8
Hungary	kg	63.9	51.3	42	59
<b>European Union</b>	<b>kg</b>	<b>73.4</b>	<b>72.6</b>	<b>69.6</b>	<b>71.9</b>

The table indicates that large consumers in Europe are also countries such as: Poland, Estonia, Russia, Belgium, Ukraine, and Lithuania.

The smallest consumers are: Slovenia, Bulgaria, Italy, Serbia, with an estimated consumption of less than 40 kg/per capita.

### Dynamics of areas and yields for potato-growing in Romania

Romania is among the first 20 potato producers in the world. It is, also, one of the few European countries where the potato production has increased - from 2.8 million ton in 1961 to approximately 4 million ton in 2005, and the potato consumption per capita almost doubled in 1990.

Potato is an important crop for the Romanian agriculture and for the national economy, a production of 2.4 million being obtained per year (in 2012). Almost the entire potato production from Romania is traded as fresh potatoes and only 2 % of the production is processed.

In the last years, remarkable results have been obtained regarding the use of potatoes as ethanol source for fuel. The tubers produced in the Southern part of the country, using irrigation, have a sufficient content of starch to allow the obtaining of 4,000 l of ethanol per hectare.

In our country, between the two world wars, the potato-growing area was of 144 thousand ha. Only from 1950, more substantial increase of potato-growing areas has been registered.

The area and production of potatoes in Romania in different periods is indicated in Table 6. As someone could see, the largest potato-growing area in our country was registered in 1989, of 351.4 thousand ha, with an average yield of 12,395 kg/ha.

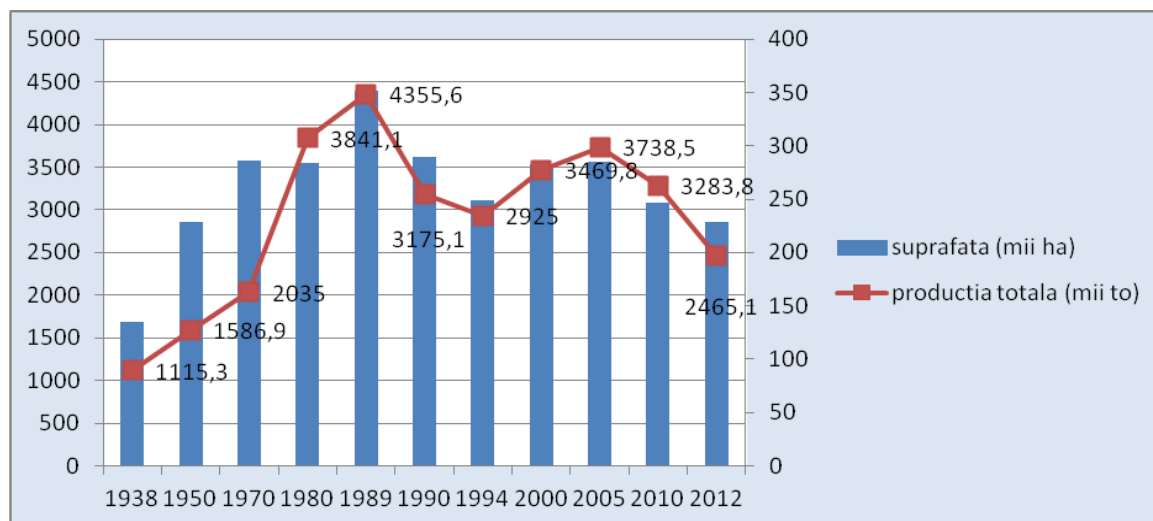
Table 6. Evolution of potato-growing areas and production in Romania

Specificati on	Years										
	1938	1950	1970	1980	1989	1990	1994	2000	2005	2010	2012
Area Thousand ha	135.10	228.50	286.10	286.40	351.40	289.60	248.60	282.70	285.31	246.98	229.05
Total production thousand t/ha	1115.38	1586.9	2035.02	3841.19	4355.60	3175.17	2925.02	3469.80	3738.59	3283.86	2465.15
Average production t/ha	8,256	6,945	7,113	13,412	12,395	10,964	11,766	12,273	13,103	13,296	10,762

From 1990, the farmed areas have decreased drastically, the smallest farmed area being registered in 1994, meaning 248.6 thousand ha.

The situation has improved, reaching in 2005 a farmed area of 285.31 thousand ha. Some could see that the areas vary significantly, and in 2012, in our country, only 229.05 thousand ha were cultivated with potatoes.

Figure 3. Dynamics of potato-growing areas and production in Romania, during the period 1938-2012



It has to be also noted that the yields in our country are the lowest in Europe (approximately 13 t/ha), being one of the reasons for the diminishing of the areas, considering that in Romania, large quantities of imported potatoes have entered, having more competitive prices.

## CONCLUSIONS

1. In Europe, the potato consumption has the highest level in the world.
2. The global potato-growing area is stable, at around 18-19 million ha.
3. The significant decrease of potato-growing areas, especially in the European Union countries, is mainly a result of the spectacular increase of the yield per ha, and a second possible cause is the development of food industry that offer a totally different value to the processed potatoes.
4. In the European Union, a decrease of the potato-growing areas was registered, while the yield per hectare has been increased, especially in the country with technology based agriculture.
5. Romania is among the first 20 potato producers in the world.
6. The largest potato-growing area in our country was registered in 1989, of 351.4 thousand ha, with an average yield of 12.395 kg/ha.
7. The yields in our country are the lowest in Europe (approximately 13 t/ha), and the Romanian market was penetrated by large quantities of imported potatoes, with more competitive prices.

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