COMPARISONS BETWEEN THE PRODUCTION OBTAINED AND THE SEED NECESSARY FOR THE MAIN GRAINS IN THE WORLDWIDE GEOGRAPHIC AREA

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ABSTRACT: In the current paper I present the tendency of the consumption of seeds and the connection between this and the agricultural production. In the seed industry there are on-going changes of the directionalities from quantity to quality, reason because of which an important issue is to find out how these two are inter-conditioned and how they are reflected in the agricultural production obtained. The exemplifications for the wheat, barley and corn cultivations during the period between 2000-2010 by highlighting at the level of the main world areas, reveal correlating aspects of the dependency of the total productions on the quantities of seeds utilized. The analysis was conducted through statistical indicators: the average, the standard deviation, the square average deviation, the variation coefficient and the limits of trust for a certain risk. In the dynamic of the years of the last decade there is observed a differentiation within the geographical areas, situations which are also dependent upon the quantities of seeds utilized.
Key words: cereals, seeds, grain, utilized/ available seeds, areas, type/ hybrid/ seed line/ seed production distribution.

INTRODUCTION
During the current stage, the food security represents a problem whose effect is the existence of malnutrition, but at the same time an important role is given by the development of the seed production/ distribution. Among the means utilized to increase the agricultural production as a whole, the seed is the only link created by the agricultivation for agricultivation, while all the other means (mechanization, fertilization, chimization, etc) represent the contribution of the industry to the increase of the agricultural production.
The current paper researched a knowing of the tendency of the obtained production and the seed consumption which would allow to establish the seed tendency → production in time and space.

RESEARCH METHODOLOGY
The increase of the agricultural production is determined greatly by the quality of the seeds utilized, reason for which upon sowing the areas assigned to the consumption production, it can be deduced that the seed production constitutes a necessity of the agricultural production.
The indicators utilized in this paper are:

1. The average achieved during the analysed period: (x) $= \Sigma(x)$ / n : in which x represents the productions of the years and *n* represents the number of years.

2. The square average deviation (σx), which reveals to us the degree of spreading around the average:

$$(\overline{\sigma x}) = \sqrt{\frac{\Sigma(x-\overline{x})^2}{n(n-1)}}$$

3.The limits of trust for the various degrees of risk are calculated with the expression:

$\overline{x}$ +/- σx *tp , in which:

x represents the average production achieved during the analysed period

σx - the square average deviation;

tp – table value according to the degrees of freedom (GL) and of risk (probability of transgression); in this paper I used a probability of 80-90%, for a risk of 10-20%.

4. The standard deviation of the set, which reveals the degree of spreading of the set:

$$\sigma = \sqrt{\frac{\Sigma(x-\overline{x})^2}{n-1}}$$

5. The variation coefficient (C%) given by the formula: C% = σ/ x *100, in which:

x represents the average production achieved during the analysed period

σx - the square average deviation.

The significance of the variation coefficient is estimated knowing that if the values obtained are:

less than 10 % - small variation; between 10,1 % and 20 % - medium variation; greater than 20,1 % - great variation

6. The percentage increase of the production as compared to a reference year. In this paper, I calculated the increase in the year 2010 as compared to the year.

These indicators were calculated for the wheat, barley and corn production, for the productions obtained and the seed consumption, and I conducted comparisons for large geographical areas: the European Union, the West Asia area, other areas and World Total. By this I aimed at highlighting the characteristics of every one of these areas for the purpose of identifying some individual tendencies.

RESULTS OBTAINED

The seed consumption on the wheat, barley and corn cultivations by geographical areas.

A major role contributing to the increase of the agricultural production during the contemporary stage is given by the *intensification of production*, resulting from the fact that the areas afferent to the agricultural cultivations cannot be increased and the agricultural-food products are increasing both in volume and in variety, as well.

This is the main reason to increase by all means possible the productivity of each hectare of agricultural land. Regarding the total consumption of seed, through an analysis at worldwide scale, I observed that there are differentiations both in the geographical space and in the main types of seeds cultivated. Table 1 shows this structure for the great geographical areas, which is completed by the values of the square average deviations, the limits of the trust and the variation coefficient, which highlights the following aspects:

- for wheat, it is observed that there is a quantitative growth of the total consumption of seed both at worldwide level as well for the European Union area and other areas between +16,5% and +5,6% (except West Asia, where there is a slow decrease observed). The square average deviation reveals for this product a degree of spreading with limits between 350 (at worldwide level) and 5l (in West Asia); the percentage registers successive steps between 1% and 3%. The limits of trust regarding risk is given by oscillatory values ± which with respect to the average of the period analysed place the corresponding risk levels in percentage of an estimated 10-20%. With respect to the variation coefficient, it is observed that the level values for wheat within the analysed areas are under 10%, the significance represents a low level of variation;

The quantity of seeds for the barley cultivation decreases at worldwide level, but also in the structure of all the areas. The square average deviation reveals a degree of spreading with an amplitude registered at the minimum 30 (in West Asia) and maximum 214 (average at worldwide level), for which there are registered percentages of 1% and 3%. The limits of trust delimit the deviations which indicate oscillations ± as compared to the average of the period analysed. The analysis of the variation coefficient is under 10% for which the cultivation of barley is registered also with a low variation;

For corn, a slight increase is observed for the seed quantities, but this increase is only for West Asia and Other areas, while registering a diminishing for the European Union area. For this cultivation, a degree of spreading is observed significantly, revealed by the highest amplitude of the values for the square average deviation, which is between 1 (in the West Asia area) and 60 (for the worldwide average), and the percentage values are between 1% and 2%. Regarding the limits of trust it is observed that there are very high levels at worldwide level as well as in the other areas, but very low levels for the European Union area and the West Asia area. The lowest variation coefficient, between 2.81 and 4.54 shows that for this seed cultivation the variation is low.

Table 1. The evolution of the total seed consumption in wheat, barley and corn cultivations by geographical areas during the period between 2000-2010

Area	Cultivation	UM	Years				Average 2005-2010 (x)	the square average deviation (x)	Limits of trust		Variation coefficient	
			2000 …	…2005 …	2009	2010			x +/- sx *tp(80%-90%)		/x*100	Significance
EU	Wheat	thousands to	5245	5436	6149	6113	5661	135	5860	5463	6,29	low
		%	100,0	103,6	117,2	116,5	108	3	112	104	6,29	low
	Barley	thousands to	2644	2717	2671	2543	2692	31	2737	2646	3,04	low
		%	100,0	102,7	101,0	96,2	102	1	104	100	3,04	low
	Corn	thousands to	422	435	423	406	435	7	446	424	4,54	low
		%	100,0	102,9	100,1	96,1	103	2	106	100	4,54	low
West Asia	Wheat	thousands to	2504	2593	2299	2499	2418	51	2493	2343	5,55	low
		%	100,0	103,5	91,8	99,8	97	2	100	94	5,55	low
	Barley	thousands to	1120	1090	939	940	1003	30	1047	958	7,88	low
		%	100,0	97,3	83,9	84,0	89	3	93	86	7,88	low
	Corn	thousands to	62	64	67	65	64	1	65	63	3,74	low
		%	100,0	102,9	106,8	105,0	103	1	105	101	3,74	low
Other areas	Wheat	thousands to	24290	25440	26244	25661	25575	273	25978	25173	2,82	low
		%	100,0	104,7	108,0	105,6	105	1	107	104	2,82	low
	Barley	thousands to	5705	5611	4699	4708	5372	175	5630	5114	8,60	low
		%	100,0	98,4	82,4	82,5	94	3	99	90	8,60	low
	Corn	thousands to	5073	4852	5139	5265	5142	59	5229	5054	3,05	low
		%	100,0	95,7	101,3	103,8	101	1	103	100	3,05	low
World	Wheat	thousands to	32038	33469	34692	34273	33654	350	34170	33138	2,75	low
		%	100,0	104,5	108,3	107,0	105	1	107	103	2,75	low
	Barley	thousands to	9469	9417	8309	8191	9066	214	9381	8751	6,23	low
		%	100,0	99,5	87,8	86,5	96	2	99	92	6,23	low
	Corn	thousands to	5558	5351	5628	5736	5641	60	5730	5553	2,81	low
		%	100,0	96,3	101,3	103,2	102	1	103	100	2,81	low

Source: The Productions Domain. 2012. FAOSTAT,
http://faostat3.fao.org/home/index.html#DOWNLOAD_STANDARD

Hence, we can draw the conclusion that there is a differentiated state of the seed consumption within the geographical areas, but which registers a low variation.

There still remains to assess the problem of knowing the seed consumption levels, but this has to be achieved through comparing numbers within the same geographical areas, levels which are shown in Table 2. The analyses were conducted with respect to the total, in relative values, for the structure of the years between 2000-2010. The following were possible to be assessed:

- for the European Union area, the seed consumption in annual dynamics, with respect to the total worldwide consumption, it is observed that this is lower by a great deal as compared to the other geographical areas, and for West Asia as well as for the other areas the consumption is higher by a great deal;

- the square average deviation is sub-unitary which points to the fact that, for these comparative percentage values, a very low degree of spreading (the Other areas zone is characterised by the highest oscillations of the trust limits); the variation coefficient is also under 10%, the significance being registered at a low variation.

Table 2.- The evolution of the structure of the total consumption of seed for the wheat, barley and corn cultivations by geographical areas during the period between 2000-2010

Cultivation type	Area	Years				Average 2005-2010 (x)	Square average deviation (x)	Trust limits x +/- sx *tp(80%-90%)		Variation coefficient	
		after 2000	until 2005	2009	2010					/x*100	Significance
Wheat	European Union	16,4	16,2	17,7	17,8	17	0,26	17,2	16,4	4,09	low
	West Asia	7,8	7,7	6,6	7,3	7	0,20	7,5	6,9	7,38	low
	Other areas	75,8	76,0	75,6	74,9	76	0,24	76,4	75,6	0,85	low
	World Total	100,0	100,0	100,0	100,0	X	X	X	X	X	X
Barley	European Union	27,9	28,8	32,1	31,0	30	0,55	30,6	28,9	4,93	low
	West Asia	11,8	11,6	11,3	11,5	11	0,25	11,4	10,7	6,05	low
	Other areas	60,2	59,6	56,6	57,5	59	0,58	60,0	58,3	2,58	low
	World Total	100,0	100,0	100,0	100,0	X	X	X	X	X	X
Corn	European Union	7,6	8,1	7,5	7,1	8	0,15	7,9	7,5	5,05	low
	West Asia	1,1	1,2	1,2	1,1	1	0,02	1,2	1,1	4,00	low
	Other areas	91,3	90,7	91,3	91,8	91	0,14	91,4	90,9	0,42	low
	World Total	100,0	100,0	100,0	100,0	X	X	X	X	X	X

Source: The Productions Domain, 2012, FAOSTAT, http://faostat3.fao.org/home/index.html#DOWNLOAD_STANDARD

The agricultural production capacity–comparisons within the worldwide geograophic area. The grain production at worldwide level signifies in the dynamics of the period represented by the last decade, growth tendencies revealed both through the records of the period between 2000-2010 and also through the comparison with the annual total for the main grain products (wheat + barley + corn). The comparison of the level values conducted through the analysis of the annual dynamics in Table 3 highlights the following differentiated aspects:

Table 3. The evolution of the structure of the total consumption of seed for the wheat, barley and corn cultivations by geographical areas during the period between 2000-2010

Area	Cultura	UM	Years				Average 2005-2010 (x)	Square average deviation (x)	Trust limits x +/- sx *tp(80%-90%)		Variation coefficient /x*100	Significance
			after 2000	until 2005	2009	2010						
UE	Grâu	mil to	132,4	135,4	138,5	139,1	134,7	3,6	140,0	129,3	low	low
		%	100,0	102,3	104,6	105,0	101,7	2,7	105,8	97,6	low	low
	Orz	mil to	60,2	54,8	62,1	53,2	58,5	1,6	60,9	56,1	low	low
		%	100,0	91,1	103,2	88,4	97,3	2,7	101,3	93,3	7,36	low
	Porumb	mil to	51,6	63,2	57,8	57,3	56,8	2,0	59,8	53,8	9,40	low
		%	100,0	122,7	112,2	111,2	110,2	3,9	116,0	104,4	9,40	low
West Asia	Grâu	mil to	28,1	33,6	30,1	28,9	29,5	1,0	30,9	28,0	8,97	low
		%	100,0	119,3	106,9	102,6	104,7	3,5	110,0	99,5	8,97	low
	Orz	mil to	9,1	11,8	9,6	9,9	10,0	0,6	10,9	9,1	16,32	medium
		%	100,0	129,2	105,2	108,1	109,5	6,8	119,4	99,5	16,32	medium
	Porumb	mil to	3,1	5,6	5,5	5,4	5,0	0,3	5,5	4,5	17,58	medium
		%	100,0	178,4	174,0	172,0	160,5	10,7	176,2	144,7	17,58	medium
Other areas	Grâu	mil to	425,1	457,9	518,1	485,7	471,8	12,7	490,5	453,0	7,13	low
		%	100,0	107,7	121,9	114,3	111,0	3,0	115,4	106,6	7,13	low
	Orz	mil to	63,8	72,0	79,9	60,4	70,8	3,0	75,2	66,3	11,24	medium
		%	100,0	112,9	125,2	94,7	110,9	4,7	117,9	104,0	11,24	medium
	Porumb	mil to	537,8	644,8	755,9	777,6	693,7	33,0	742,5	644,9	12,60	medium
		%	100,0	119,9	140,6	144,6	129,0	6,1	138,1	119,9	12,60	medium
World	Grâu	mil to	585,7	626,9	686,6	653,7	635,9	14,9	658,0	613,9	6,21	low
		%	100,0	107,0	117,2	111,6	108,6	2,5	112,3	104,8	6,21	low
	Orz	mil to	133,1	138,7	151,6	123,5	139,3	4,1	145,4	133,3	7,76	low
		%	100,0	104,2	113,9	92,8	104,7	3,1	109,2	100,1	7,76	low
	Porumb	mil to	592,5	713,6	819,2	840,3	755,5	33,9	805,5	705,5	11,86	medium
		%	100,0	120,4	138,3	141,8	127,5	5,7	136,0	119,1	11,86	medium

Source: The   Productions   Domain,   2012,   FAOSTAT, http://faostat3.fao.org/home/index.html#DOWNLOAD_STANDARD

at worldwide level, the total production of wheat and corn are increasing, and the barley productions are registering a decrease. In the structure of the geographical areas analysed the most significant growth which must be mentioned for corn are those in West Asia, where the growth between 2000-2010 is of +60,5 %, alongside the one in Other areas which registers +29,2 %. Even at worldwide level, by comparison with the same timeframe, the growth of the corn production is of +27,5 %;
- the square average deviation and its wright through the values of the probability in absolute and relative digits show variations (significant amplifications appear only in the Other areas zone);
- the limits of trust register oscillations corresponding to the amplitudes of the maximum values are also registered for the Other areas zone which are influencing the worldwide level;

The variation coefficient registers value differentiations, reason because of which the significance falls between a medium variation (between 10,1% and 20%) for the barley and corn cultivation in West Asia as well as in other areas, as well as corn at worldwide level; for the cultivations in the rest of the cultivation zones there is only a low variation (lower values than 10%). Especially, the European Union zone should be mentioned, situation in which for all the cultivations the significance of the productions is low.

With respect to the total grains, Table 4 presents a comparison in the structure of the areas for each of the three main categories of grain. For the period between 2000–2010 the following aspects are observed:

Table 4. The evolution of the structure of the total consumption of seed for the wheat, barley and corn cultivations by geographical areas during the period between 2000-2010

Cultivation	Area	Years 2000 …	…2005…	…2009	2010	Average 2005-2010 (x)	square average deviation (x)	Trust limits x +/- sx *tp(80%-90%)		Variation coefficient /x*100	Significance
Wheat	UE	22,6	21,6	20,2	21,3	21	0,39	21,7	20,6	4,9	low
	West Asia	4,8	5,4	4,4	4,4	5	0,21	4,9	4,3	12,0	medium
	Other areas	72,6	73,0	75,5	74,3	74	0,44	74,8	73,5	1,6	low
	World total	100,0	100,0	100,0	100,0	X	X	X	X	X	X
Barley	UE	45,2	39,5	41,0	43,1	42	0,75	43,1	41,0	4,7	low
	West Asia	6,9	8,5	6,3	8,0	7	0,52	8,0	6,5	19,1	medium
	Other areas	47,9	52,0	52,7	48,9	51	0,73	51,7	49,6	3,8	low
	World total	100,0	100,0	100,0	100,0	X	X	X	X	X	X
Corn	UE	8,7	8,9	7,1	6,8	8	0,37	8,1	7,0	12,9	medium
	West Asia	0,5	0,8	0,7	0,6	1	0,03	0,7	0,6	12,0	medium
	Other areas	90,8	90,4	92,3	92,5	92	0,38	92,3	91,2	1,1	low
	World total	100,0	100,0	100,0	100,0	X	X	X	X	X	X

Source: The Productions Domain, 2012, FAOSTAT,
http://faostat3.fao.org/home/index.html#DOWNLOAD_STANDARD

- the European Union zone registers 1/5 of the total of the wheat production and approximately 40% of the barley production;
- the greatest total productions of wheat and corn, which are above approximately 2/3 in wheat and respectively over 9/10 of the total, which are registered in Other areas (excluding the European Union and West Asia);
- square average deviation is sub-unitary, with particular reference to the barley cultivation for which the levels are the highest recorded;
- the limits of trust are oscillating between 0.6 and 92.3, by especially mentioning the Other areas, where for each of the three cultivation grains the results registered represent the highest values (49.6 and 92.3), which points to the existence of some very great variations of the productions in this area;
- the variation coefficient is registering the medium level of variation (between 10.1% and 20%) for wheat and barley in West Asia and corn in the European Union area and West Asia; low variation (with values less than 10%) which is registered for wheat and barley in the European Union and worldwide total, alongside that of corn for the Other areas zone.

CONCLUSIONS

From the ensemble of the situations described in the structure of this paper, the following conclusions can be drawn:

The situation of differentiating the seed consumption within the structure of the analysed geographical area starts from the requirements of the market, which are generating the tendency of obtaining crops for which it is necessary to know the requirements of the soil/ hybrid/ seed set.

For this reason, there are tendencies approached within some bi-dimensional purposes with regard to: *a)* the establishing of the dependence of the production which can be achieved on the structure of the soil by which to establish very efficient quantitative and qualitative levels given the conditions of a certain area; b) the identification and ensuring of the possible sources of providing each factor in the given agricultural production area. Through the analysis of the statistical results revealed from the *situation of the seed consumption*, the fact can be emphasized that within the European Union the existing levels, as compared to the total worldwide consumption, are significantly lower than the ones in the other geographical areas, and for West Asia and the Other areas this consumption is significantly greater. At the same time, the square average deviation for these comparative percentage values is sub-unitary, which points to a very low degree of spreading (for the Other areas zone), which is characterized also by the highest oscillations of the limits of trust. For the ensemble of the analysed areas, the comparative percentage values show a very low degree of spreading, which falls under the category of low variation. Effectively, this is about the seed consumptions in the structure of the geographical areas, since it was observed that for the European Union the level of seed consumption is significantly lower than the seed productions achieved, and for West Asia and the Other areas this seed consumption is significantly larger. In a differentiate manner, it is observed that there exist some annual rhythms of growth in the seed consumptions, differentiated by geographical areas. This level of consumption is edifying with respect to the influence of the levels of the productions achieved, reason because of which it is necessary to know not only the available quantities of seed, but also the relation of economic and demographic dependency of the area agricultural-food system, in which the different forms and degrees of intensity of the food crisis are manifested.

The production of grains at worldwide level, correlated directly with the seed consumption, signifies in the dynamics of the period given by the last decade, the tendencies of a level of growth; these tendencies are differentiated (with respect to the main grains). The square average deviation and its weight among the probability values in absolute and relative digits points to low variations, and the limits of trust register appropriate oscillations (significant amplifications with a maximum level are recorded for the Other area zones), which influence the worldwide level. The significance of the variation coefficient falls between a medium variation (for the barley and corn cultivation in West Asia and Other areas, as well as corn at worldwide level), but also a low variation (for the cultivations in the rest of the cultivation areas).

For the production of grains, the limits of trust signify the existence of some very large variations of the productions in the Other areas zone.

The existence of annual rhythms of growth in the seed consumption is differentiated by geographical areas. This level of consumption is edifying with respect to the influence of the levels of productions achieved, reason because of which it is necessary to know not only the quantities of available seeds, but also but also the relation of economic and demographic dependency of the area agricultural-food system, in which the different forms and degrees of intensity of the food crisis are manifested.

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