

THE ECONOMIC EFFICIENCY OF GENETIC PROGRESS FOR THE WINTER WHEAT VARIETIES APPROVED IN ROMANIA DURING 2000-2010

Ana URSU^{1*}, Luise-Maria GHEORGHIU²

*E-mail: ursu.ana@iceadr.ro

Received June 1, 2011

ABSTRACT - The purpose of this study is to analyze the genetic progress in wheat crop, regarding the quantitative performance and economic aspect, the leading indicators for measuring efficiency being: production costs, price recovery and additional income as the main indicators to measure the effectiveness of genetic progress in increasing profit / ha. In order to highlight the genetic progress of created and approved individual varieties, there was calculated the quantitative contribution of new genotypes and the results were reported to the most representative areas for wheat production. The quantitative genetic progress was estimated with the help of the regression function. The quantitative relationship between variables, regarding the contribution of genotypes to genetic progress increase, quantified with the help of coefficient (b) of the linear regression equation, presents the following significant values (in ascending order) for areas analyzed: 10.62 kg/ha/year for genotypes grown in the south in irrigated, 12.05 kg/ha/year for genotypes grown in Transylvania, 19.26 kg/ha/year for

genotypes grown in the west and 21.25 kg/ha/year for genotypes grown in Moldova. The approach taken justifies the context in which the genetic research and breeding work is a primary importance solution in view of further increase in wheat production in Romania. The economic results obtained show that the newly created genotypes are equipped with high capacity of efficient capitalizations of areas of cultivation, the rate of return exceeding 25% (Glosa - 32%, Gruia - 37%, Izvor - 44%).

Key words: Economic efficiency; Genetic progress; Genotype; Phenotype.

REZUMAT. *Eficiența economică a progresului genetic la soiurile de grâu de toamnă, omologate în România în perioada 2000-2010.* Scopul acestui studiu constă în analiza progresului genetic la cultura grâului, sub aspectul performanțelor cantitative și sub aspect economic, principalii indicatori pentru măsurarea eficienței fiind: costurile de producție, prețul de valorificare și profitul suplimentar, ca principali indicatori care măsoară eficiența

¹ Research Institute for Agricultural Economics and Rural Development, Romania

² Academy of Agricultural and Forestry Sciences „Gheorghe Ionescu-Șișești”, Romania

progresului genetic în creșterea profitului/ha. Pentru a pune în evidență progresul genetic individual al soiurilor create și omologate, s-a calculat aportul cantitativ al noilor genotipuri, iar rezultatele obținute au fost raportate la cele mai reprezentative areale pentru producția de grâu. Estimarea progresului genetic cantitativ s-a realizat cu ajutorul funcției de regresie. Relația cantitativă dintre variabile, privind contribuția genotipurilor la creșterea progresului genetic, cunoscând cu ajutorul coeficientului (b) al ecuației de regresie liniară, prezintă următoarele valori medii semnificative (în ordine crescătoare) pentru arealele analizate: 10,62 kg/ha/an pentru genotipurile cultivate în sudul țării în sistem irigat; 12,05 kg/ha/an pentru genotipurile cultivate în Transilvania; 19,26 kg/ha/an pentru genotipurile cultivate în vestul țării și 21,25 kg/ha/an pentru genotipurile cultivate în Moldova. Motivarea demersului întreprins justifică contextul în care cercetările de genetică și lucrările de ameliorare reprezintă o soluție de primă importanță, în perspectiva creșterii în continuare a producției de grâu în România. Rezultatele economice obținute demonstrează faptul că genotipurile nou create sunt dotate cu o capacitate superioară de valorificare eficientă a arealelor de cultivare, rata rentabilității depășind 25% (Glosa - 32%, Gruia - 37%, Izvor - 44%).

Cuvinte cheie: eficiență economică; progres genetic; genotip; fenotip.

INTRODUCTION

For Romanian agriculture it is imperative to obtain agricultural products in terms of economic efficiency, as support in the global market competition, efficiency that is primarily based on the use of advanced and clean techniques. Such

a goal can be primarily supported through creating new productive genotypes, improving culture technologies, increasing returns of the allocated factors, reducing consumption per unit of product, increase of the production quality (a prerequisite), reducing environmental pollution etc.

Growing a variety of wheat requires an option for a production technology, a certain amount of expenses and a certain amount of production, requiring them to a certain profit. Knowledge of a variety of wheat is necessary and possible under a number of issues: the ecobiologic potential, stability in production, pest and disease resistance, drought tolerance, fall, shake etc. (Drăcea and Săulescu, 1967). This is because the wheat varieties grown in each area and each unit separately, show a range of performance characteristics with implications for efficiency of production costs in general and profit in particular. The results make it possible to know the contribution made by each variety, in which conditions they are manifested, the efforts claimed and the effects produced (Ceapoiu *et al.*, 1984).

MATERIALS AND METHOD

In order to quantify the genetic progress achieved in wheat improving there were used the production results achieved in the State Institute for Variety Testing and Registration from Romania network, between the years 2000 - 2007,

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for the winter wheat varieties approved in this period³.

The wheat varieties used in the study were: Boema (approved in 2000, created by NIARD Fundulea (National Institute for Agricultural Research and Development Fundulea), Ciprian (approved in 2003, created by ARDS Lovrin (Agricultural Research and Development Station Lovrin), Crina (approved in 2001, created by NIARD Fundulea), Crișana (approved in 2005, created by ARDS Oradea), Delabrad 2 (approved in 2002, created by NIARD Fundulea), Dor F (approved in 2002, created by NIARD Fundulea), Dumbrava (approved in 2003, created by ARDS Turda), Eșențial (approved in 2001, created by ARDS Suceava), Faur (approved in 2004, created by NIARD Fundulea), Glosa (approved in 2005, created by NIARD Fundulea), Gruia (approved in 2005, created by NIARD Fundulea), Iași 2 (approved in 2002, created by ARDS Podu-Iloaiei), Izvor (approved in 2008, created by NIARD Fundulea), Voroneț (approved in 2004, created by ARDS Suceava), Turda (approved in 2000 created by ARDS Turda), Șimnic 50 (approved in 2004, created by ARDS Șimnic).

As a reference witness, we used the Fundulea 4 variety, approved in the year 1987, with high production potential and a broad area of culture. The set research directions refer to quantifying of the genetic contribution in increasing wheat yield compared with the Fundulea 4 variety witness, and economic efficiency analysis of genetic progress, as the main factor determining the increase of profit per hectare (Biji and Popescu – Negură, 1971; Biji *et al.*, 1985).

In order to quantify the genetic influence on levels of production, it has been developed a model for establishing the genetic contribution of approved varieties in terms of quantitative performance (quantitative genetic progress) and under economic aspect, regarding the production costs, sales prices, incomes and additional net income as the main indicators that quantify the effectiveness of genetic progress, its contribution in increasing the profit per hectare. The model elements are defined by production capacity and production growth compared with the witness variety.

$X_{t+n} = Pg (x_t, x_{t+1}, \dots, x_{t+n})$
(Ursu, 2007)

where:

$t = 0, 1, \dots, 9$, study period;

x_t = genotypes production;

x_{t+n} = produced growth (2000 – 2007);

Pg = quantitative genetic progress

The proportionate effects (positive or negative) were modulated with the help of linear equations, algebraic, by form: Y_t

$= a + bx_t$ where $a \geq 0$, and $b \begin{cases} > \\ = \\ < \end{cases} 0$ as the

proportional effect is positive or negative.

For determining the existence of a solution, the model requires the establishment of some restrictions:

$Pg (x_t, x_{t+1}, \dots, x_{t+n}) > I_j$

where:

I_j is the quantitative and morpho-physiological characters of the witness variety, its level being below par in relation to genetic progress Pg .

In practical terms, the ecobiologic potential of wheat genotypes is considered to be the average maximum yields obtained by applying the best agrophytotechnical measures within 3 years (the years before the approval) in different locations.

³ State Institute for Variety Testing and Registration from Romania - Technical documentation for approval of the wheat varieties

RESULTS AND DISCUSSION

1. The quantitative genetic progress

Area 1A - south – Watering.

The genotypes approved between the year 2000 and 2007, for the south area, compared with the witness variety (in the same climatic conditions and technological factors allocated), had a different behaviour, depending on variety characteristics and climatic conditions in which there were tested for approval.

The comparison between the witness and the new varieties developed, highlights a variable productive capacity of new genotypes, depending on the area of culture. In case of the south area of the country under irrigated cultivation, production of new genotypes increased significantly compared to the witness, running in some micro-regions over 6.4 t / ha, the genetic contribution exceeding 900 kg/ha plus great stability in time. It should be noted that with the application of irrigation water, average consumption of additional factors allocated also increases, especially fertilizers from 80-100 kg / ha to 120-150 kg / ha N and 70-80 kg / ha to 90-100 kg / ha P2O5.

The comparison analysis of production achieved at created genotypes and the approving year, in relation to culture area (genotype x environment interaction) (Cosmin *et al.*, 1987) concerns the correlation of individual contribution of each

genotype and also the influence that genotype exert in that area on the expression of genetic progress.

The quantitative relationship between variables, regarding the contribution of each genotype on genetic progress increase, measured by the coefficient (b) of the linear regression equation has an average of 10.628 kg / ha / year for cultivated genotypes (*Fig. 1*).

Area 2B South-Est. In less favourable conditions in the hilly area is noted, compared with the witness variety, the genotype Dor F with an increased production of 109 kg / ha (2.2%), Faur, with 142 kg / ha (4.4%) and genotype Izvor, respectively 192 kg / ha (3.9%). In this area, compared with witness, Boema, Gloria and Gruia varieties had production values below the witness (values between 15 kg / ha și 154 kg / ha), production of the Șimnic 50 variety being the only one with 455 kg. / ha less than the witness one. Annual contribution, quantified using the regression function is, on area level, at an average of -1.9926 kg / ha / year (*Fig. 2*).

Area 1B West. The same genotypes, cultivated in the west area of the country, proved to be as productive, some of them being noticed by an increase of production. Significant progress has been registered by the following genotypes: Gloria 648 kg / ha (11.5%), Gruia 427 kg / ha (7.4%), Izvor 475 kg / ha (6.6%), Ciprian 335 kg / ha (5.8%). In these conditions also, the variety Șimnic 50 presented lower

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productions than the witness with 662 kg / ha (-12.4%). Study of the bilateral relationship between genotypes and approval year (quantified by the coefficient b of the

regression equation) point out, at area level, a contribution in growth of genetic progress, averaging 19.265 kg / ha / year (Fig. 3).

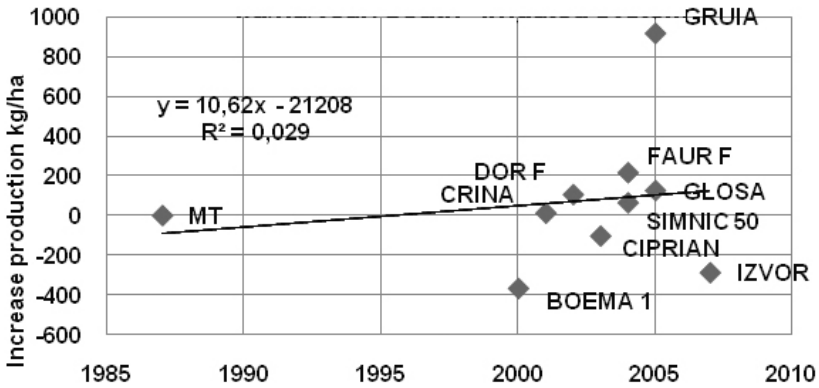


Figure 1- Genetic progress level recorded in 1987 - 2007 through the introduction of new wheat varieties approved (kg/ha/year), South – irrigated system

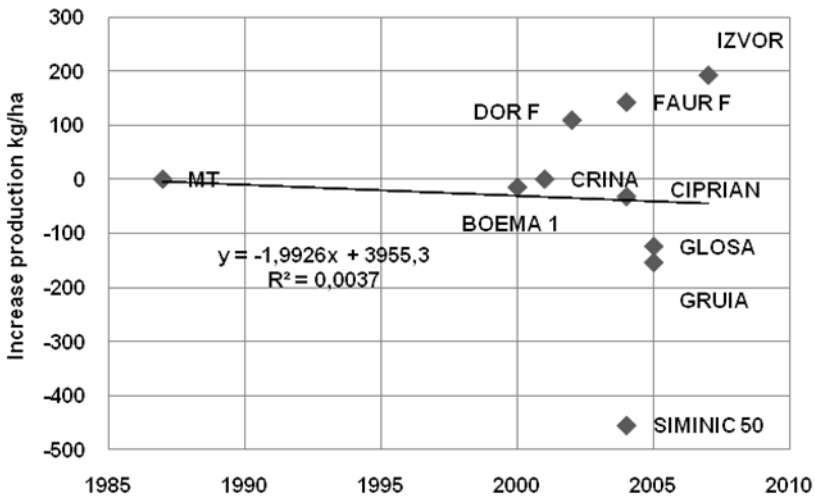


Figure 2 - Genetic progress level recorded in 1987 - 2007 through the introduction of new wheat varieties approved (kg/ha/year), South - East

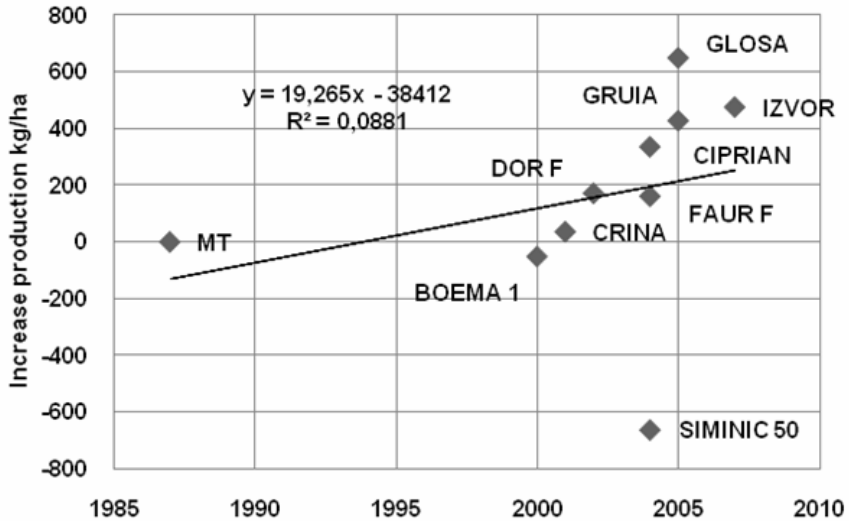


Figure 3 - Genetic progress level recorded in 1987 - 2007 through the introduction of new wheat varieties approved (kg/ha/year), West

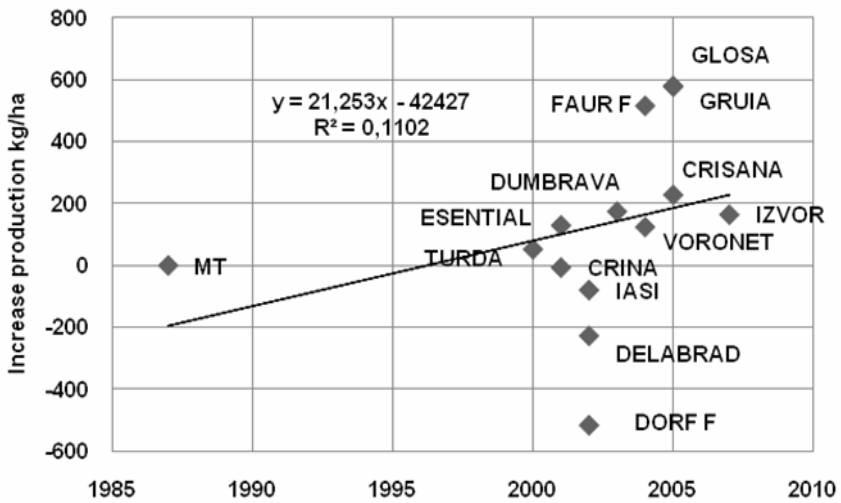


Figure 4 - Genetic progress level recorded in 1987 - 2007 through the introduction of new wheat varieties approved (kg/ha/year), Moldova

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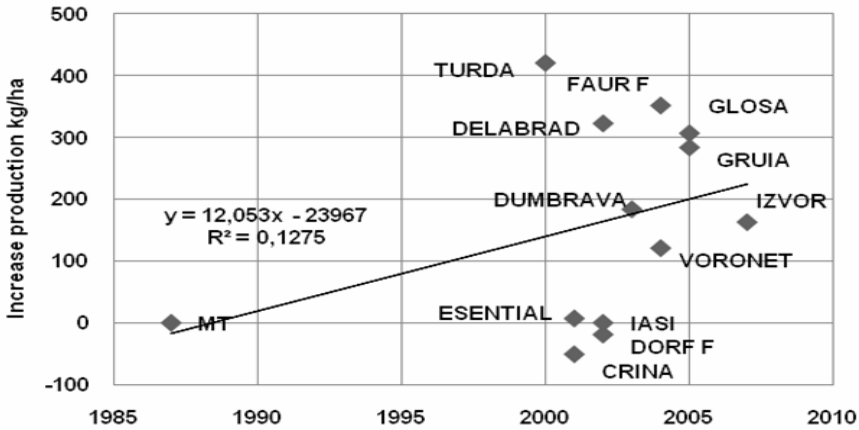


Figure 5 - Genetic progress level recorded in 1987 - 2007 through the introduction of new wheat varieties approved (kg/ha/year), Transylvania

Area 2A Moldavia. The production capacity, under the climatic conditions from Moldova, is shown by a large amplitude of variation of production by changing the main agro-ecological parameters. It highlights the genotypes (in order of their approval): Drobeta 174 kg/ha (3%), Faur 516 kg/ha (11%), Voroneț 124 kg/ha (3%), Gloria 580 kg/ha (11%), Gruia 578 kg/ha (11%), Crișana 228 kg/ha (4.1%), Izvor 164 kg/ha (3%). Compared with the witness variety, three of the analyzed varieties recorded lower production, respectively: Dor F less with 517 kg/ha (9%) Delabrad with 228 kg/ha (4%) and Iași 80 kg/ha (-1.4%). The quantified contribution in growth of genetic progress in this area is on average 21.253 kg/ha/year (Fig. 4).

Area 3B Transylvania. In this area, with specific climatic conditions, the new created and approved

genotypes make production increases as follows: Turda 421 kg/ha (7.4%), Faur 352 kg/ha (7.2%), Delabrad 323 kg/ha (6.7%), Gloria 307 kg/ha (5.4%), Gruia 284 kg/ha (5.1%), Drobeta 184 kg/ha (3.2%). For the Transylvania area, the value of the regression coefficient (b) regarding the annual contribution of these genotypes to genetic progress increase, is on average 12.053 kg/ha/year (Fig. 5).

The justify for the results of new approved genotypes (lower quantity and quality production) which is below the threshold limit of statistical assured production, compared with the witness, may be due to specific climatic conditions for cultivation from this area.

2. Economic efficiency of genetic progress

Quantifying the economic efficiency of genetic progress at wheat varieties is determined by the comparison between control requirements and responses of the witness variety (which was characterized by high phenotypic plasticity, genotypic stability and a noticeable quality) and newly developed varieties.

The materialization of the biological potential of compared genotypes has been achieved at the same level of the technological potential ($Pt = 1$), meaning when the whole range of agrophytotechnical measures was applied correct (identical biological categories and quantities of seed/ha, optimal doses of fertilizers and economically equal, adequate volume of water and irrigation rules, balanced use of herbicides and pesticides etc.) (Socol, 1981).

As theoretical background, the quantifying process of the economic efficiency of genetic progress and multiple comparisons of main indicators of efficiency was made by crediting the witness (Fundulea 4), with relative value of 100% and use of alternatives with the genotypes on culture areas. By establishing of these restricted elements resulted that the total production cost is identical for both productions: the witness and the new genotypes.

Production expenditure (lei/ha).

The determination of production costs per hectare for wheat genotypes, was established on the basis of the calculation set by the economic sector

of the Institute of Agrarian Economy - Academy of Agricultural and Forestry Sciences, for the year 2009/2010. These elements of calculation set in the budget of revenues and expenses for wheat crop, state budget changes for the year 2009/2010 resulted from granting of 210 lei / ha for a hectare of farmland. In this way there were determined the implications of production expenses, of the allocated factors cost (in different climatic conditions), on the effect of economic efficiency of genetic progress.

Using this variant (subsidized) by calculating the main efficiency indicators, high production costs required to establish a minimum price, uniform for all culture conditions of 0,95 lei.

Area 1A South – irrigated.

Under irrigation, at a production increased by 27.4% (overall area), the expenses recorded values between 0.2% and 11.8%, compared to the projected production in the income and expenditure budget (*Table 1*).

At a production level of 6,000 kg / ha, the share of direct production costs account for 92% of total expenditure, the remaining 8% representing indirect costs. Important are material costs which are holding the first position in the structure of cost items, their share being 57% from the total direct costs of production. Of the variable costs, it is remarkable the mechanical works spending, whose share reached 40% and labour costs, with a low share of 4%. This disproportionate ratio is the result of the degree of technological works mechanization for wheat crop. Also, from the analysis of cost

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components, it is noted the special contribution of inputs allocated expenses, which are (depending on genotype) between 1387 lei/ha for Şimnic 50 variety and 1842 lei/ha for Gruia variety, the tie between the limits of this amplitudes being recorded due to the different level of production of the new genotypes. Regarding the irrigation costs, these vary from 787 lei/ha for the Faur variety and up to 1045 lei/ha for the Gruia variety.

The maximum of total production costs per hectare is 4977 lei/ha for a production of 6.4 tons, when the Gruia variety is cultivated.

Area 1B West Country – irrigated. The variation of materials expenses is higher than in the south area, ranging between 1.422 lei/ha for the Şimnic 50 variety and 1.869 lei/ha for the Izvor variety, which is the newest created genotype. While production increased by 37.9% the costs level is amplified by 0.5% - 11.2%. The registered differences appear to be generated by different productions made during the 3 years preceding the approval.

A similar dynamic regarding the production costs volume is seen in areas of Moldova and Transylvania and less like in the agro-area 2 B South - East. The costs per hectare increase as production increases. For Moldavia area at a production increase of 49%, expenses increase by 0.6% -11.4%, while in Transylvania, at a production increase of 40%, expenses increase by 1.5% - 6.8% .

The amplitude of production variation (4795 kg / ha) and of production costs per hectare (3896 lei/ha) in Moldavia area, is smaller at Vorenet variety and maximum for Drobeta variety (5951 kg/ha 4720 lei/ha). For Transylvania area, the Iasi variety is at the same level as the witness, both as production level (4879 kg/ha) and as the costs level (3969 lei/ha), while Izvor genotype is at the top competitive varieties for this area (6794 kg/ha 5145 lei/ha).

Production cost (lei/t). The amplitude of variation for the cost of production variable, dependent on production level, is as follows: for the south area of the country, maximum is for Gruia variety 807 lei/t (3626 kg/ha) and minimum is for the Gloria variety 799 lei/t (5094 kg/ha); for south area under watering maximum cost is for the Faur variety 814 lei/t (5020 kg/ha) and minimum is for the Gruia variety 774 lei/t (6434 kg/ha), for the West area, maximum cost is the Faur variety 807 lei/t (5529 kg/ha) and minimum is for the Izvor variety 660 lei/t (7657 kg/ha); for the South area, maximum is for the Faur variety 885 lei/t (3380 kg/ha) and minimum is for Crina variety 803 lei/t (5669 kg/ha); for Moldavia, the highest cost of production is recorded by Vorenet variety 813 lei/t (4795 kg/ha) and the lowest one is recorded by Eşential variety 794 lei/t (5926 kg/ha); in Transylvania area, the maximum cost is registered by Iaşi variety 813 lei/t (4879 kg/ha), the minimum one being recorded by Izvor variety 757 lei/t (6794 kg/ha) (*Tables 1-4*).

**Table 1 - The main indicators of economic efficiency of genetic progress at winter wheat growing
Area 1 A South – Watering**

No.	Genotype	Approval year	Average production kg/ha	Increase production kg/ha	Total income lei/ha	Production cost lei/ha	Production expenditure lei/ha	Profit witness lei/ha	Additional profit lei/ha	Total profit lei/ha	Profit rate witness %	Total profit rate %
1	Boema	2000	6418	-366,1	6097,0	774	4969	114	1475,6	1127,8	29,7	22,7
2	Crina	2001	5747	12	5459,7	800	4599	140	849,2	860,6	18,5	18,7
3	Dor F	2002	6390	105	6070,5	775	4955	123	1015,4	99,8	20,5	22,5
4	Ciprian	2003	5619	-103	5338,1	804	4518	141	917,5	819,7	20,3	18,1
5	Faur	2004	5020	215	4769,0	814	4086	169	478,5	204,3	11,7	16,7
6	Șimnic 50	2004	4633	64	4401,4	809	3748	177	593,0	60,8	15,8	17,4
7	Glosa	2005	5492	125	5217,4	807	4435	150	664,0	118,8	15,0	17,7
8	Gruia	2005	6434	914	6112,3	774	4977	140	266,9	868,3	5,4	22,8
9	Izvor	2007	6260	-287	5947,0	781	4889	119	1330,4	-272,7	27,2	21,6

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Table 2 – The main indicators of economic efficiency of genetic progress at winter wheat growing Area 2 B South-Est

No.	Genotype	Approval year	Average production kg/ha	Increase production kg/ha	Total income lei/ha	Production cost lei/ha	Production expenditure lei/ha	Profit witness lei/ha	Additional profit lei/ha	Total profit lei/ha	Profit rate witness %	Total profit rate %
1	Boema	2000	6092	-15	5787,4	788	4800	129	1002,1	-14,3	987,8	20,6
2	Crina	2001	5669	0	5385,6	803	4550	142	835,2	0,0	835,2	18,4
3	Dor F	2002	5173	109	4914,4	813	4206	161	604,7	103,6	708,2	16,8
4	Ciprian	2003	4475	-32	4251,3	835	3738	185	543,4	-30,4	513,0	13,7
5	Faur	2004	3380	142	3211,0	885	2993	273	83,5	134,9	218,4	7,3
6	Şimnic 50	2004	2581	-455	2452,0	886	2287	292	597,2	-432,3	165,0	7,2
7	Glosa	2005	2983	-124	2833,9	873	2603	281	348,8	-117,8	231,0	8,9
8	Gruia	2005	2930	-154	2783,5	868	2543	281	387,0	-146,3	240,7	9,5
9	Izvor	2007	5082	192	4827,9	810	4116	166	529,9	182,4	712,3	17,3

Table 3 – The main indicators of economic efficiency of genetic progress at winter wheat growing Area 1 B Vest

No.	Genotype	Approval year	Average production kg/ha	Increase production kg/ha	Total income lei/ha	Production cost lei/ha	Production expenditure lei/ha	Profit witness lei/ha	Additional profit lei/ha	Total profit lei/ha	Profit rate witness %	Total profit rate %	
1	Boema	2000	5594	-51,3	5314,6	805	4502	143	861,0	-48,7	812,2	19,1	18,0
2	Crina	2001	5857	36	5564,2	797	4666	137	864,4	34,2	898,6	18,5	19,3
3	Dor F	2002	5812	171	5521,4	798	4639	141	720,3	162,5	882,8	15,5	19,0
4	Ciprian	2003	6151	335	5843,5	785	4832	135	693,6	318,3	1011,9	14,4	20,9
5	Faur	2004	5529	161	5252,6	807	4459	150	640,2	153,0	793,1	14,4	17,8
6	Şimnic 50	2004	4663	-662	4429,9	824	3843	155	1215,7	-628,9	586,8	31,6	15,3
7	Glosa	2005	6274	648	5960,3	719	4511	128	833,8	615,6	1449,4	18,5	32,1
8	Gruia	2005	6196	427	5886,2	693	4293	120	1187,9	405,7	1593,5	27,7	37,1
9	Izvor	2007	7657	475	7274,2	660	5051	92	1772,2	451,3	2223,5	35,1	44,0

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Table 4 - The main indicators of economic efficiency of genetic progress at winter wheat growing
Moldavia

No.	Genotype	Approval year	Average production kg/ha	Increase production kg/ha	Total income lei/ha	Production cost lei/ha	Production expenditure lei/ha	Profit witness lei/ha	Additional profit lei/ha	Total profit lei/ha	Profit rate witness %	Total profit %
1	Turda	2000	6144	52	5836,8	786	4828	129	959,6	49	1009,0	19,9
2	Crina	2001	5798	-7	5508,1	799	4630	138	884,6	-7	877,9	19,1
3	Esențial	2001	5926	129	5629,7	794	4706	137	801,2	123	923,7	17,0
4	Dor F	2002	5230	-517	4968,5	812	4249	141	1210,7	-491	719,5	28,5
5	Delabrad	2002	5556	-228	5278,2	806	4477	139	1017,5	-217	800,9	22,7
6	Iași	2002	5800	-80	5510,0	799	4631	136	954,6	-76	878,6	20,6
7	Dumbrava	2003	5951	174	5653,5	793	4720	137	767,7	165	933,0	16,3
8	Faur	2004	5189	516	4929,6	813	4218	174	221,1	490	711,3	5,2
9	Voroneț	2004	4795	124	4555,3	813	3896	174	541,5	118	659,3	13,9
10	Glosa	2005	5747	580	5459,7	800	4599	155	309,6	551	860,6	6,7
11	Gruia	2005	5748	578	5460,6	800	4600	155	311,9	549	861,0	6,8
12	Crișana	2005	5849	228	5556,6	797	4661	142	679,2	217	895,8	14,6
13	Izvor	2007	5572	164	5293,4	805	4488	149	649,8	156	805,6	14,5
												18,0

Table 5 – The main indicators of economic efficiency of genetic progress at winter wheat growing Transylvania

No.	Genotype	Approval year	Average production kg/ha	Increase production kg/ha	Total income lei/ha	Production cost lei/ha	Production expenditure lei/ha	Profit witness lei/ha	Additional profit lei/ha	Total profit lei/ha	Profit rate witness %	Total profit rate %	
1	Turda	2000	6132	421	5825.4	786,3	4821	138	604,1	400	1004,1	12,5	20,8
2	Crina	2001	5178	-51	4919,1	813,0	4210	155	757,6	-48	709,2	18,0	16,8
3	Esențial	2001	5235	7	4973,3	812,4	4253	155	713,9	7	720,5	16,8	16,9
4	Dor F	2002	4911	-19	4665,5	813,7	3996	165	687,3	-18	669,2	17,2	16,7
5	Delabrad	2002	5145	323	4887,8	813,4	4185	169	396,2	307	703,0	9,5	16,8
6	Iași	2002	4879	0	4635,1	813,5	3969	167	666,0	0	666,0	16,8	16,8
7	Dumbrava	2003	5850	184	5557,5	796,8	4661	141	721,3	175	896,1	15,5	19,2
8	Faur	2004	5254	352	4991,3	812,1	4267	166	390,1	334	724,5	9,1	17,0
9	Voroneț	2004	5138	121	4881,1	22,4	25,5	162	586,8	115	701,8	14,0	16,8
10	Glosa	2005	5948	307	5650,6	793,3	4719	141	640,3	292	931,9	13,6	19,7
11	Gruia	2005	5903	284	5607,9	795,0	4693	141	645,4	270	915,2	13,8	19,5
12	Izvor	2007	6794	163	6454,3	757,2	5145	114	1154,7	155	1309,6		

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The resulting amplitude of variation is due to a different variety structures (Sica, 1993). In the South-East the cost of production levels are significantly higher than in other areas of culture. Also, significant differences appear in the inter-area comparisons between genotypes, which are oscillating from one area to another. Thus, Izvor variety grown in the West, make a production cost of 660 lei/t, due to higher production levels, while grown in the South area, records a cost of 810 lei/t, the level of material costs being on an inverse proportional position, of 1869 lei/ha in the West and 1523 lei/ha in South-East.

Total income (lei/ha). The analysis of this indicator is important in the way of properly and stimulatingly achieving of production costs, enabling a profit, which favours the development of wheat production in Romania.

The maximum values of total revenue, are recorded by varieties: Izvor (7274 lei/ha), Gruia (6112 lei/ha), Turda (5836 lei/ha) and Gloria (5960 lei/ha). The market price is an element with a decisive role in increasing income, if it is properly established, it stimulates production and may influence the resumption of production for the next crop (*Tables 1- 4*).

The profit (lei/ha). The comparison between the profit and the approval year, highlights varieties, which recorded growth rates of profit: Crina (approved in 2001), whose level of profit is 898 lei/ha, Dor F

(approved in 2002), conducts a profit of 1115 lei/ha, Drobeta (2003), 933 lei/ha, Ciprian (2004), 1011 lei/ha, Gloria (2005), 1449 lei/ha Gruia (2005), 1593 lei/ha Izvor (2007), 2223 lei/ha. Significant differences appear when interzonale analysis is made, as follows: Crina - up to 898 lei/ha in the West area and a minimum of 835 lei/ha in South-East area, Dor F - up to 1115.2 lei/ha in the South watering area and a minimum of 708 lei/ha, Drobeta - max 933 lei/ha in Moldavia and a minimum of 896 lei/ha in Transylvania, Ciprian - maximum 1011 lei/ha in the West area and minimum 513 lei/ha in South-East area, Gloria - maximum 1449 lei/ha in the West area and minimum 769 lei/ha in the South area; Gruia - maximum 1593 lei/ha in the West area and minimum 518 lei/ha in the South area, Izvor - maximum 2223 lei/ha in the West area and minimum 712 lei/ha in South East area. At the production price of 0.95 lei/kg, the profit became stimulating, ranging from 513 lei/ha in South-East area, represented by the Cyprian variety and 2223 lei/ha in West 1B area, represented by the Izvor variety.

Extra profit (lei/ha). The value of the added production made by new genotypes compared with the witness can be considered as additional net profit. Its level measures the economic efficiency of genetic progress, of higher profitability achieved by the new varieties developed in the period 2000-2007.

Depending on the area where they were grown, the contribution of

each genotype to increase economic efficiency (when all factors of production are assured) is as follows:

- for the South area of the country, at the Glosa variety, as a result of joint action of all factors of production (mechanization, chemisation, varieties of superior biological categories, but without irrigation), the realized profit is 769 lei/ha, of which genetic progress is 248 lei/ha (32%) and others' contribution factors cumulatively 521 lei/ha (67%);

- under irrigation, it is noted Gruia genotype, which made the biggest profit of 1135 lei/ha, of which the genetic contribution is 868 lei/ha; the Faur variety made a profit of 682 lei/ha, of which the genetic contribution is 204 lei/ha;

- for the South East area the biggest profit is made by Izvor variety, 712 lei/ha, of which the genetic contribution is of 182 lei/ha;

- in the West area, there are remarked the following varieties (in order of approval) : Ciprian (318 lei/ha), Glosa (615 lei/ha), Gruia (405 lei/ha) and Izvor variety with an additional profit of 451 lei/ha.

Regarding the economic efficiency of the influence on the genetic factor, for the Moldavia area, the most significant varieties are: Essential (123lei/ha), Dumbrava (165 lei/ha), Faur (490 lei/ha), Voroneț (118 lei/ha), Glosa (551 lei/ha), Gruia (549 lei/ha), Crișana (217 lei/ha) and Izvor (156 lei/ha); for Transylvania area, Turda variety contributes to the overall profit increase from 49 lei/ha

up to 400 lei/ha when it is grown in Moldavia.

Profit rate (%). The profit rate differs depending on the level of profit and the expenses of production made by each genotype.

In the South area of the country – under irrigation, the average profit rate increase at 45%, the genetic factor provides a rate of return of 5% on average. The lowest rate of return of 13% was recorded in South-East area, the explanation would be the lower productions made in the years prior approval due to the drought (year 2004).

In the West area of the country, the genetic plus contributes to profitability increase from 17% (Faur variety) to 44% (Izvor variety), in Moldavia, from 16.9% (Voroneț variety) to 20.9% (Turda variety) and in Transylvania from 16.7% (Faur variety) to 25.5% (Izvor variety) (*Tables 1- 4*).

CONCLUSION

After analyzing the indicators of economic efficiency, consisting of total income (lei/ha), witness income (lei/ha), total profit (lei/ha), additional profit achieved by the contribution of genotype, witness profit rate (%) and total profit rate (%) we can appreciate the results as follows:

Crina (2001) may be recommended for the West area of the country, recording the best economic values of the examined indicators;

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Esential (2001) may be recommended for the Moldavia area, where it registers significant values of efficiency of genetic contribution of 13%, and for the area of Transylvania, where the amount of genetically effective contribution is 7%;

Dor F (2002) made the most significant economic value accumulated in the South area – under irrigation. The selection after the production increase obtained gives it the first place for growing in the South-East and West areas;

Delabrad (2002) is a genotype that meets the economic criteria, achieving optimum values in Transylvania. It can also be grown in Moldavia, the criterion for increasing the wheat growing area in this zone, being the stability of production;

Iași (2002) meets the technical optimum criteria in Moldavia and Transylvania, in terms of production stability;

Ciprian (2003) may be recommended for cultivation in the West area, where it's made the most significant values of efficiency;

Dumbrava (2003) obtains higher efficiency values for areas of Moldavia and Transylvania;

Faur (2004), for all the five economic criteria mentioned, the variety is located favorably in all areas of culture;

Șimnic 50 (2004) meets the economic optimum conditions for the south area of the country - under irrigation;

Voronet (2004) stores symmetrical values for the areas of Moldavia and Transylvania, having a degree of efficiency of the genetic contribution of 16.8% -16.9%;

Glosa (2005) is characterized by higher values for all selection criteria in all areas of culture. In particular a significant efficiency regarding the genetic contribution is made in Moldavia area (64%), in the West area (42.5%) and in Transylvania (31%);

Gruia (2005) is an efficient genotype in terms of genetic progress contribution, mainly in the South area – under irrigation (76.5%), in Moldavia (63.8%), in Transylvania (29.5%) and in the West of the country (25%);

Crișana (2005) may be recommended for the hilly region of Moldavia where the economic value of the efficiency is 19%;

Izvor (2007) assures the achieving of the highest levels of efficiency in South East area (25.3%), in West area (20.3%), in Moldova (19%) and in Transylvania (11%).

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