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President's Allocution

*We have the special pleasure to let you know that the Review of our University, „**Bulletin of Scientific Information**", having ten years of consecutive issue, it achieved the recognition of the **National Council for Scientific Research in Higher Education (NURC)**, being comprised in the category „**National Reviews – C Category**".*

*So, the Bioterra University review „**Bulletin Of Scientific Information**" works as a real platform for the information and exhibition of the most recent and valuable research in the agricultual field and connected sciences (food industry, agro-tourism, ecology, agricultural economics etc.).*

This way I express my gratitude the contributors to our review, authoritative academic and univeritary names of whose studies are found in the selection done by the scientific board of the review, co-workers with whom we have strong relations of partnership and mutual support in the development and course of some conjointed research projects.

I wish to the review many and consistent issues.

Prof. Floarea Nicolae, PhD
President of Senat Bioterra University Bucharest

Summary:

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COMPLIANCE WITH LEGISLATION REGARDING THE DETERMINATION OF FATT IN „SIBIU SALAMI"

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Abstract: *This presentation brings to the fore the issue of compliance with the legislation in force, with the main objective determination of the fat content of Sibiu Salami, for human consumption. According to the Ministerial Order 560/2006, approving the Norms regarding the marketing of meat products, Sibiu salami should not contain more than 46% fat [11].*
The fat in this matrix represents a physico-chemical parameter regulated by law, the determination of fatty substances is Soxhlet method, which is considered to be the most accurate, which is the reference method [1;7].

Key words: *sibiu salami, fats substances, legislation*

Introduction

First you have to know that fat is essential for life. The human body needs fat to function, as part of every cell fats (cholesterol, for example). Also, fat is a component of very important hormones [6]. The brain is mostly fat. Although man has the ability to produce fat, food intake enough help to good health long term. Dietary fats were sentenced to two aspects: high caloric intake and risk of cardiovascular disease. Both ideas have been refuted by reality and time. Even comes with 9 kcalorii per gram fat, it offers a greater feeling of fullness.
So eating more fat you fuller (a) adjustment depending on energy intake and other factors. As cardiovascular disease, after several decades is that only certain types of fats, as part of a certain way of eating can affect blood vessels [8]. Not at all fat and from any source in any diet. And, of course, too little cholesterol in foods influences the amount of blood. The body produces excess cholesterol in response to external or internal aggression, so cholesterol is not the „cause" of disease, but an effect. For many years of nutrition science was made by chemists, fats were divided by degree of saturation: saturated, monounsaturated, polyunsaturated [9].
After the 50's it was thought that „saturatele are bad" but now we getting more information as unsaturated excess is very harmful. Regardless of these assumptions, the reality is that natural sources of fat contain a mixture of fat, in variable proportions.
Becomes so useless to classify fats anyway since it would be difficult and unproductive to obtain food by 100% of a certain type of fat. Depending on the species of animal or plant and how growth/feeding in food can have different types of fats in various proportions. For example, corn has grown pig fat worse than a wild pig with natural food. Also, even olive oil, there are great differences from year to year or from one area to another.

Materials and methods

Fats substances contained in Sibiu Salami were determined in laboratory of University Bioterra of Bucharest. This method was validated and accredited by Romanian Accreditation Association National Accreditation Body.

For this determination were used:

- Scientific VELP extraction apparatus (figure 1);
- Filter cartridges;
- The usual laboratory glassware;
- Analytical Balance Partner AC/220/C/2;
- Oven „Air Concept";
- Petroleum ether.

Figure 1. Soxhlet Extractors [18]

All reagents used were of analytical grade whole sale glassware was calibrated by the Romanian Bureau of Legal Metrology. The fat in the sample was extracted to exhaustion with petroleum ether solvent and after removal of solvent extraction was weighed and expressed the result [4;15;17]. Pass weighed quantity in a filter cartridge or filter paper envelope made defatted , delete capsule with a cotton ball soaked in solvent defatted whole cartridge is inserted. Sample cartridge is inserted into the extractor unit [5;14;16].

The scheduled work times appear: Immersion - 30 minutes; Wash - 120 minutes; Recovery - 25 minutes.

Glass extraction of the device is placed in a constant mass prior to drying oven at 102^{0}C, weighed to the nearest 0.2 mg and install the device with a content of 50 ml petroleum ether [12;2]. By heating oil ether vapor extraction glasses go through extractor, reaching refrigerant, which condenses and falls as food drops in the cartridge. The ether extract of the fat, bringing with him looked fat product.

After completion of the extraction, the cartridge is removed, and then light petroleum was recovered. Extraction cup dried in oven 1 hour at 102^{0}C, then cooled in a desiccator, bring to constant mass and weighed to the nearest 0.2 mg [13;3].

Results and discussions

We analyzed a set of 6 samples. But, one of these samples was within the limits set in law. We have analyzed this sample of Sibiu salami, crafted in double drawn at random on the Romanian market. In accordance with legislation the maximum limits is up to 46%. The value obtained was (figure 2):

Sample 1

M_0 = 5.0025 g m_1 = 78.6261 g m_2 = 76.4376 g;

G_1 = (78.6261 - 76.4376) / 5.0025 x 100 = 43.74%;

G_1 = 43.74%

Sample 2

M_0 = 5.5020 g m_1 = 75.8768 g m_2 = 73.5280 g;

G_2 = (75.8768 - 73.5280) / 5.5020 x 100 = 42.68%;

G_2 = 42.68%

Sample 3

M_0 = 5.0020 g m_1 = 77.6362 g m_2 = 76.3680 g;

G_3 = (77.6362 - 76.3680) / 5.0020 x 100 = 25.35%;

G_3 = 25.35%

Sample 4

M_0 = 5.0103 g m_1 = 74.5110 g m_2 = 73.2931 g;

G_4 = (74.5110 - 73.2931) / 5.0103 x 100 = 25.30%;

G_4 = 24.30%

Sample 5

$M_0 = 5.0020$ g $m_1 = 78.6270$ g $m_2 = 76.5015$ g;

$G_5 = (78.6270 - 76.5015) / 5.0020 \times 100 = 42.50\%$;

$G_5 = 42.50\%$

Sample 6

$M_0 = 5.25$ g $m_1 = 78.3884$ g $m_2 = 75.6216$ g;

$G_6 = (78.3884 - 75.6216) / 5.2501 \times 100 = 52.69\%$;

$G_6 = 52.69$ %

Conclusions

These measurements allow on the one hand, food quality control, compliance with the permissible maxim fatty substances and the authenticity of products. Relatively simple, quite fast compared to the classical method proved to be very sensitive, repeatable, reproducible. However the fat content of these samples exceeded the legal limits allowed.

Applicability, repeatability, reproducibility of this method for determining the fat content of food was demonstrated by analyzing a large number of samples, here we present only several samples.

For the determination of fats substances in Sibiu Salami method presented in this article were made statistical calculations, development, validation, accreditation of methods, these being the subject of the next research topics.

Now when you think of „healthy fats" take into account all factors: source, mode of preparation, combination with other foods, integrating them into your lifestyle (diet, sports). Dietary fat intake is increased gradually, with small amounts of one food, just so that you learn to eat the best, in the quantities you need.

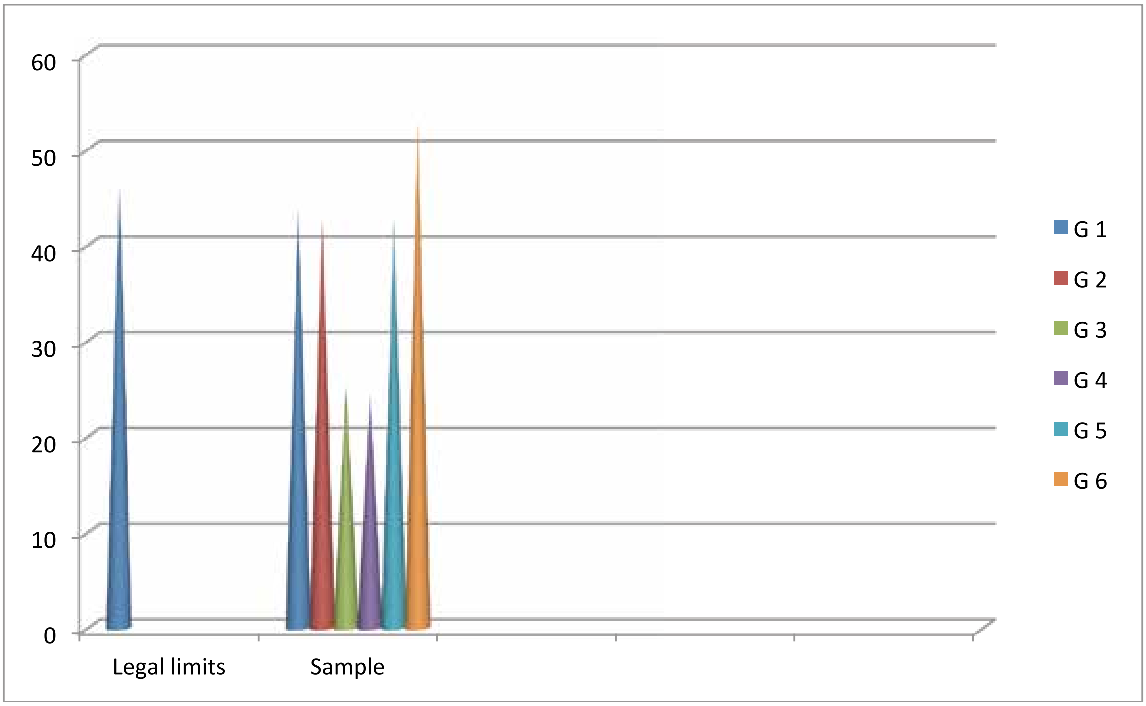

Figure 2. Comparative analysis of the results obtained measurements to the maximum allowed by law (%)

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RESULTS CONCERNING THE INFLUENCE OF THE PLANT DENSITY AND FERTILIZATION ON THE SUNFLOWER HYBRIDS DENSITY (HELIANTHUS ANNUUS)

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Abstract: *The main goal of this research theme is to find the best sunflower hybrids (Helianthus annuus) suitable for the South area of Romania, which in various fertilization and technology conditions can give high and stable yields. Crop management was performed in optimal technology, specific to the area of culture, not irrigated variant, the researched genotypes consisting in three hybrids: Performer (control), Barolo RO, and PR64A89.*

The experiment was placed on a uniform land concerning the fertility and the landscape, on a chernozem soil, in an experimental field belonging to NARDI Fundulea. The conclusions consist in detecting the associated influence of two culture factors, respectively the plant density and fertilization, on the sunflower yield in the climatic conditions of the year 2012.

Key words: *helianthus annuus, density, fertilization, yield*

Introduction

Sunflower (Helianthus annuus) is one of the most valuable cultivated plant due to very high productivity and multiple uses of its products in human alimentation, livestock breeding and industry. In the last decade, due to the application of more efficient technologies and obtaining of new hybrids, the sunflower yield considerably increased in some countries, even spectacular.

Worldwide sunflower has an important place in surface terms, being surpassed only by wheat, rice and maize.

Because of the importance of favorable economic conditions, sunflower still holds an important place in our country's agriculture. The average yield per hectare at national level depends very much on the evolution of the climatic conditions and soil natural fertility (Bîlteanu, Gh., 2003).

Efficient use of natural resources for sunflower yield, in order to be cost-efficient, requires rigorous zoning hybrids, depending on climatic resources and their biological requirements (Hera, C., Sin, Gh., Toncea, I., 1989).

The approached issues covered research objectives aimed at optimizing the culture technology in order to achieve maximum and constant sunflower yield, in the soil and climate conditions of southern Romania, also pursuing the economic efficiency and environment protection.

The objectives in the research were:
• Identify the productivity level influenced by different tillage methods;
• Identify the best sunflower hybrids for the south of Romania, that in different fertilization and technology to determine the achievement of high and stable yields;
• Determining the economic costs and savings generated by judicious choice of hybrid and technological links for sunflower;
• Determining the influence of technological links on yield quality;
• The formulation of practical recommendations for the conditions in South Romania, as well as other areas of similar characteristics.

Materials and methods

Research were performed in the experimental field Systems of Sustainable Agriculture and Crops Fertilization (SSA-CF) not irrigated version, in the framework of NARDI Fundulea, pursuing the following parameters:
A. Hybrids
a1 – Performer
a2 – KWS Barolo RO
a3 – PR64A89
B. Fertilization
b1 – unfertilized
b2 – N100P50
b3 –20 t/ha manure (applied to prior culture)
C. plants density
c1 – 50,000 plants/ha
c2 – 60,000 plants/ha
The experimental diagram is three factorial type of form 3 x 3 x 2, managed according to the subdivided parcels method, in three repetitions. The experimental diagram is three factorial type of form 3 x 3 x 2, arranged according to the method of subdivided parcels, in three repetitions. The experimental results were statistically processed using the variance analysis method (Gologan, I., Dornescu, A., 1981).
The experiment was placed on a uniform land, concerning the fertility and landscape, chernozem soil, specific to the experimentation area. The previous crop was wheat in all the years of experimentation.
The total testing area was of 11,760m2. The total area for the experimental plot was of 168 m2, and the yielding area of 112 m2.
The studied factors and the graduations of these factors can be found in the Figure 1.
In order to organize the experiment it was used biological material consisting of three sunflower hybrids. Crop management was performed in optimal conditions of technology specific to the culture area, the studied genotypes consisting of: Performer (test check – semi-late hybrid), Barolo RO (semi-late hybrid), and PR64A89 (semi-late hybrid).
The hybrid used as control (Performer), was obtained at NARDI Fundulea, and the other two are produced at Pioneer and KWS companies.
All the three tested hybrids registered significant results, according the new culture technologies and zoning.

» **Performer.** Simple interlinear hybrid, having a good ecologic plasticity, from the precocity group C.
Benefits: very high oil content, 51-53 %, production potential 3,800 – 4,000 kg/ha.
Morphophysiological description: tall stature 170-180 cm, large and compact florescence, seed of black color and of ovoid-oblong shape, vegetation period of 114-118 days and a flowering period of 4-5 days. Weight of 1000 grains is 63-78g.

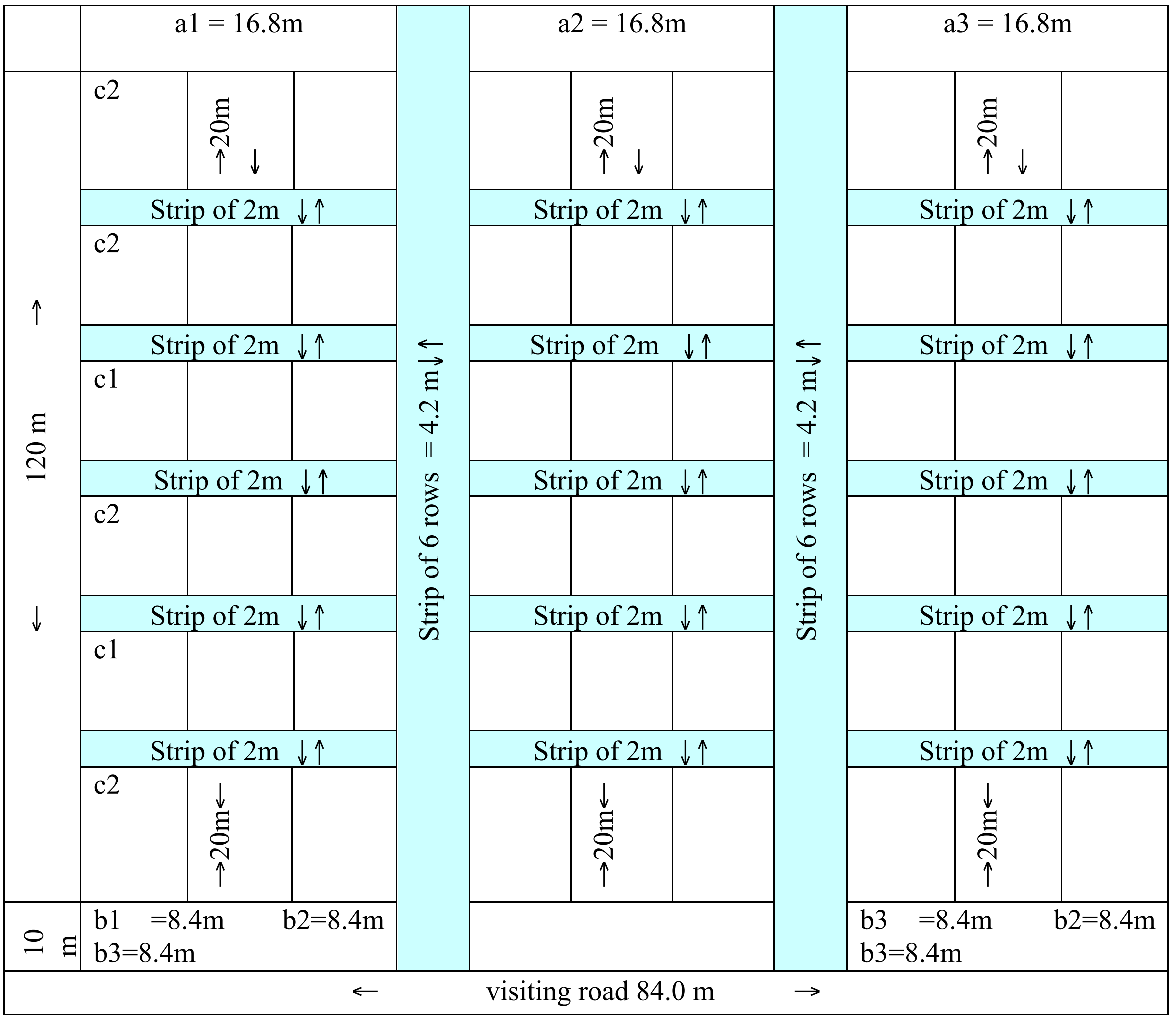

Figure 1. Experiment factors and variations set

Recommendations: sunflower cultivation in all the favorable areas, including in those affected by broomrape (Orobanche cumana) even in the case of race E.

» **Barolo RO.** The hybrid is simple, semi-late, (119 days), with a good ecologic plasticity.
Benefits: higher production capability 3,600 – 4,100 kg/ha, very high oil content (49-50%), good tolerance to drought, good resistance against breakage.
Morphophysiological description: tall stature, abundant green foliage, large capitulum, convex, with pendulum position, well covered by seeds, genetic resistance against broomrape (Orobanche cumana) including the race E.
Recommendations: densities of 45,000–48,000 pl/ha-not irrigated and 50,000–52,000 pl/ha-irrigated; cultivated in all the favorable areas for sunflower, including in those affected by broomrape, race E.

» **PR64A89.** The hybrid is simple, semi-late, with a good ecologic plasticity and tolerance against broomrape Race E.
Benefits: genetic resistance against blight

attack (Plasmopara helianti) race 304; good tolerance against the Phomopsis Stem Canker caused by the pathogen Phomopsis helianthi; tolerant to stem rot caused by Sclerotinia sclerotiorum; good resistance against drought and heat.

Morphophysiological description: tall stature, abundant dark green foliage, large capitulum, convex, with pendulum position, well covered by seeds, seeds of medium size with 1000 seeds weight 65g and hectoliter mass (HM) 40-43 kg/hl, average content of oil 46-47% (*Varieties/hybrids Official catalog of Romania, 2010).

Recommendation: cultivated in all areas of the sunflower crop in Romania, even in areas infested with broomrape race E; densities of 50-52,000 yielded plants/ha, not irrigated, and 52-55,000 yielded plants /ha, irrigated.

Results and discussions

Processing of the primary data was performed in 2012, by weighing the yield of each variant. It consisted in elimination of studied repetition, achieving the average variation, and reduction the losses and impurities and then reporting at unit area. Variance analysis shows which of the factors or combinations are of higher concern in statistical terms, which will be added to practice or scientific importance of those factors.

This way it was established the most suitable way of using the obtained data in order to make the final conclusions. So, variance analysis concerning the influence of the plant density, fertilization, and hybrid on yield at sunflower is shown in the tables below, ascertaining significant differences both for each factor individually and their interaction, irrespectively for the plant density x hybrid, fertilization x hybrid, and plant density x fertilization x hybrid Tables 1 and 2).

In Table 3 is shown the hybrid influence on the sunflower yield. The obtained data show a relatively low difference of the hybrids. The highest yield of 2,188 kg/ha was cropped at the hybrid PR64A89.

The use of the hybrid Barolo RO a leaded to a yield of 2,056 kg/ha, compared to the control Performer where it was yielded 1,850 kg/ha, the difference wasn't significant. The influence of the crop fertilization on sunflower yield in the condition of

Table 1:

Analysis of variance concerning the influence of hybrid, fertilization, and density on sunflower yield

Variant	SP	GL	S^2	F_C	Ft		Significance
					5%	1%	
A	1046855	2	523427.6	4.76	6.94	18.00	**
E_A	439587.6	4	109896.9				
B	2242190	2	1121095	14.59	6.94	18.00	*
A x B	113557.4	4	28389.3	0.37	3.26	5.41	**
E_B	922182.9	12	76848.5				
C	315875.6	1	315875.6	73.90	4.41	8.28	
A x C	55267.56	2	27633.7	6.46	3.55	6.01	*
B x C	15402.69	2	7701.34	1.80	3.5	6.01	**
AxBxC	44579.44	4	11144.86	2.61	2.93	4.58	**
E_C	76938.88	18	4274.3				

the year 2012 is shown in the Table 4. Applying to the previous culture of a 20 t/ha manure, brought a yield increase of 2,244 kg/ha, corporately to the not fertilized control of 1,757 kg/ha. The production differences are very significant or distinct significant by comparison to the control.

Table 2:

Analysis of variance proposed for the factors interaction and obtained values for T and LSD

Interaction of factors	SD	T 5%	T 1%	T 0.1%	LSD 5%	LSD 1%	LSD 0.1%
A to A	110.50	2.78	4.60	8.61	307.20	508.31	951.43
B to B	92.41	2.18	3.06	4.32	201.44	282.76	399.19
C to C	17.79	2.10	2.88	3.92	37.37	51.25	69.75
B to A	191.40	2.18	3.06	4.32	417.24	585.67	826.83
A to b	171.14	2.43	3.70	6.11	415.89	633.56	1045.41
C to A	30.82	2.10	2.88	3.92	64.72	88.76	120.81
C to b	30.82	2.10	2.88	3.92	64.72	88.76	120.81
B to C	94.94	2.18	3.05	4.30	206.57	289.62	408.14
A to C	112.63	2.75	4.54	8.43	310.25	510.85	949.97
C to A and B	53.38	2.10	2.88	3.92	112.10	153.74	209.26
B to A and C	164.44	2.18	3.05	4.30	357.79	501.63	706.92
A to B and C	175.25	2.41	3.66	6.01	423.20	642.11	1052.74

Table 3:

Influence of factor A (hybrid) on sunflower yield (kg/ha)

Variant	Average	%	Difference	Significance
a 1	1850.28	100.00		
a 2	2056.67	111.15	206.389	-
a 3	2188.61	118.29	338.333	x
LSD(P 5%) 307.20	LSD(P 1%) 508.31	LSD(P 0.1%) 951.43		

Table 4:

Influence of factor B (crop fertilization) on sunflower yield (kg/ha)

Variant	Average	%	Difference	Significance
b 1	1757.22	100.00		
b 2	2093.56	119.14	336.333	xx
b 3	2244.78	127.75	487.556	xxx
LSD(P 5%) 201.44	LSD(P 1%) 282.76	LSD(P 0.1%) 399.19		

Table 5:

Influence of factor C (plant density) on sunflower yield (kg/ha)

Variant	Average	%	Difference	Significance
c 1	2108.33	100.00		
c 2	1955.37	92.74	-152.963	000
LSD(P 5%) 37.37	LSD(P 1%) 51.25	LSD(P 0.1%) 69.75		

Table 6:

Influence of factor A (hybrid) on sunflower yield (kg/ha)
depending on factor B (crop fertilization)

Variant	Average	%	Difference	Significance
a 1 b 1	1566.67	100.00		
a 1 b 2	1930.00	123.19	363.333	-
a 1 b 3	2054.17	131.12	487.500	x
a 2 b 1	1830.00	116.81	263.333	-
a 2 b 2	2031.67	129.68	465.000	x
a 2 b 3	2308.33	147.34	741.667	xx
a 3 b 1	1875.00	119.68	308.333	-
a 3 b 2	2319.00	148.02	752.333	xx
a 3 b 3	2371.83	151.39	805.167	xx
LSD(P 5%) 415.89 LSD(P 1%) 633.56 LSD(P 0.1%) 1045.41				

Table 7:

Influence of factor A (hybrid) on sunflower yield (kg/ha)
depending on factor C (plant density)

Variant	Average	%	Difference	Significance
a 1 c 2	1754.44	100.00		
a 1 c 1	1946.11	110.92	191.667	-
a 2 c 1	2158.89	123.05	404.444	x
a 2 c 2	1954.44	111.40	200.000	-
a 3 c 1	2220.00	126.54	465.556	x
a 3 c 2	2157.22	122.96	402.778	x
LSD(P 5%) 310.25 LSD(P 1%) 510.85 LSD(P 0.1%) 949.97				

Table 8:

Influence of factor B (fertilization) on sunflower yield (kg/ha)
depending on factor C (plant density)

Variant	Average	%	Difference	Significance
b 1 c 1	1810.00	100.00		
b 1 c 2	1704.44	94.17	-105,556	-
b 2 c 1	2184.44	120.69	374,444	xx
b 2 c 2	2002.67	110.64	192,667	-
b 3 c 1	2330.56	128.76	520,556	xxx
b 3 c 2	2159.00	119.28	349,000	xx
LSD 5%=206.57 LSD 1%=289.62 LSD 0.1%=408.14				

In the next table (table 5) is shown the influence of plant density on sunflower yield. The use of a 50,000 plant/ha density, resulted a yield of 2,108 kg/ha, variant used as control.
A plant density of 60,000/ha caused a very significant yield decrease of 152 kg/ha
The organic fertilization and hybrid associated influence on sunflower yield is shown in Table 6, resulting that the highest yields were obtained by applying 20 t/ha manure, no matter the used hybrid.
Replacing organic fertilization with 20 t/ha manure with the fertilization with N100P50 or not fertilized, cased the yield of productions 363-487 kg/ha poorer at the hybrid Performer, 465-741 kg/ha at Barolo RO, and 752-805 kg/ha at the hybrid PR64A89. In all the fertilization variants, using of the hybrid PR64A89 increased the production very significant.
The associated influence of plant density and used hybrid on sunflower yield in the conditions of the year 2012 is shown in the Table 7. Out of the obtained data it results the superiority of the variant with the plant density of 50,000/ha by comparison with the variant with the plant density of 60,000/ha, at all cultivated hybrids. Differences from the variant with the plant density of 60,000/ha are significant.
The associates influence of fertilization and density on sunflower yield in conditions of 2012 is shown in the Table 8. Out of the shown data it results the higher yields were obtained by fertilizing with 20t/ha manure and using a density of 50,000 plants/ha. The fertilization with N100P70 or the lack of fertilization caused yields 350-520 kg/ha lower.

Table 9:

Influence of factor B (fertilization) on sunflower yield (kg/ha) depending on hybrid plant density

Variant	Average	%	Difference	Significance
b 1 a 1 c	1596.67	100.00		
b 2 a 1 c	2066.67	129.44	470,000	X
b 3 a 1 c	2175.00	136.22	578,333	Xx
b 1 a 1 c	1536.67	100.00		
b 2 a 1 c	1793.33	116.70	256,667	-
b 3 a 1 c	1933.33	125.81	396,667	X
b 1 a 2 c	1896.67	100.00		
b 2 a 2 c	2156.67	113.71	260,000	-
b 3 a 2 c	2423.33	127.77	526,667	Xx
b 1 a 2 c	1763.33	100.00		
b 2 a 2 c	1906.67	108.13	143,333	-
b 3 a 2 c	2193.33	124.39	430,000	X
b 1 a 3 c	1936.67	100.00		
b 2 a 3 c	2330.00	120.31	393.333	X
b 3 a 3 c	2393.33	123.58	456.667	X
b 1 a 3 c	1813.33	100.00		
b 2 a 3 c	2308.00	127.28	494.667	X
b 3 a 3 c	2350.33	129.61	537.000	Xx
LSD(P 5%) 357.79 LSD(P 1%) 501.63 LSD(P 0.1%) 706.92				

Conclusions

Synthesis of data for 2012 concerning the influence of crop fertilization on sunflower yield depending on plant density and the used hybrid is shown in the Tables 9 and 10.

By applying organic fertilization, on the background of using two densities and three hybrids, it results:

- the highest yield were obtained at the organic fertilization of 20 t manure/ha (2,054 kg/ha, respectively 2,308 kg/ha, and 2,371 kg/ha);
- concerning the plant density, the best variant was of 50,000 plants/ha, no matter the used hybrid.

Analyzing the interaction of all studied factors, we can notice a decrease of production at all three used hybrids (Performer, Barolo RO, and PR64A89) in the unfertilized variant, with statistical values as significant or very significant, ranging between 200 – 1,600 kg/ha (Figure 2).

Table 10:

Influence of hybrid, crop fertilization and plant density on average sunflower yield (kg/ha)

Variant		C_1	C_2	Average yield
A_1	B_1	1596	1536	1566
	B_2	2066	1793	1930
	B_3	2175	1933	2054
A_2	B_1	1896	1763	1830
	B_2	2156	1906	2031
	B_3	2423	2193	2308
A_3	B_1	1936	1813	1875
	B_2	2330	2308	2319
	B_3	2393	2350	2371
Average yield (kg/ha)		**2108**	**1955**	**2032**

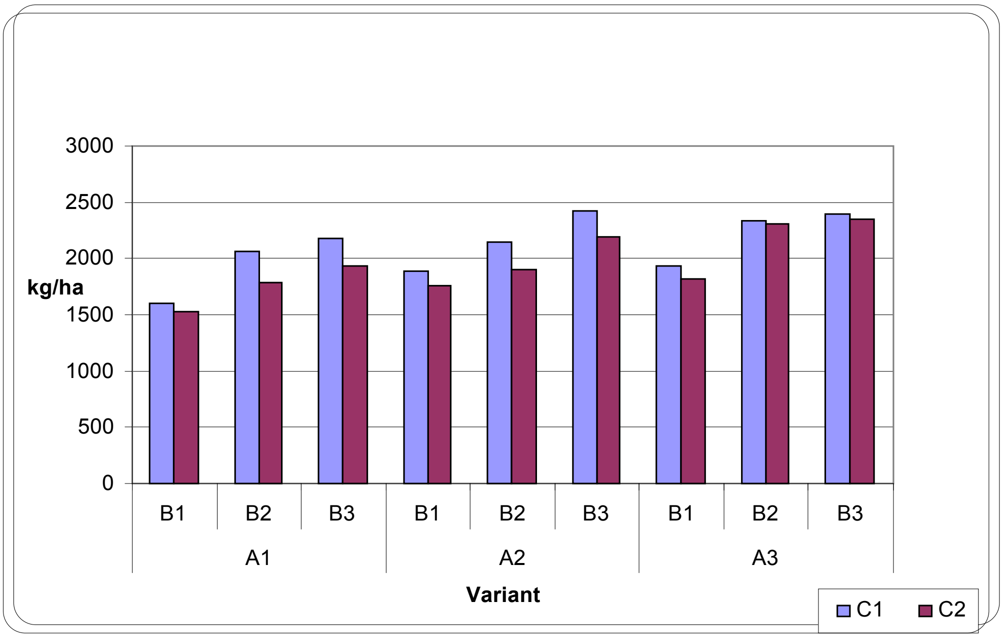

Figure 2. Influence of hybrid, crop fertilization and plant density on sunflower yield (kg/ha)

Concerning the hybrids reaction at the interaction of the studied factors, we can see they have a similar behavior, the yields being comparable depending on the applied technology.

Taking into account the studied variants, the culture of sunflower consists in fertilizing with 20 t/ha manure, using a density of 50,000 plants/ha, and using of the hybrid PR64A89.

This recommended technology is useful in the case of an agricultural year similar to 2012.

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RESEARCH ON THE INFLUENCE OF DENSITY AND FERTILIZATION CONCERNING THE SUNFLOWER (HELIANTHUS ANNUUS) HIBRIDS QUALITY ON THE CAMBIC CHERNOZEM FROM FUNDULEA

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Abstract: *Research was done in an experimental field of NARDI Fundulea, not irrigated variant, the main purpose being the influence of density and fertilization on the production quality of three sunflower hybrids (a1 – Performer; a2 – KWS Barolo RO; a3 – PR64A89). Concerning the plant density, they were used two variants, respectively c1 of 50,000 plants/ha, and c2 of 60,000 plants/ha.*
Other significant factors were the climate and soil conditions. In the area, the experimental conditions are characterized by the transition from steppe to forest steppe that allows especially the formation of cambic chernozem category soil. The quality data processing was performed following the analysis in the laboratory of sunflower seeds, yielded as samples of 750 g. After removing the impurities they have been determined 1000GrainWeight, hl mass, and the seeds oil content in the conditions of 2012 year climate.

Key words: *helianthus annuus, chernozem, hybrids, 1000GrainWeight, hl mass*

Introduction

Experimental field is in the East of Romanian Plain area, on the Mostistea river side, along the border between Vlasiei Plain and South Baragan Plain. As geographical position is approximately 44 ° 30 ‘ North latitude and 24 ° 10’ East longitude, on the territory of the Fundulea town, Călăraşi County, 34 km East of Bucharest. Fundulea groundwater depth is about 14 m and an average elevation of 56 m. The area of vegetation is at the crossing between the steppe and forest steppe. The climate is predominantly continental, with an annual average temperature of 10°C. The coldest month is January, with an average temperature of minus 3°C, and an absolute minimum of minus 26°C. The hottest month is July, having the average temperature of 22°C and 41 ° C maximum absolute temperature.

Annual precipitation averages 571mm, out of which 72% during the growing season, especially in May and June (Partal, E., Zaharia, G.V., 2008).

During the summer is only 35% of the total annual rainfall, having torrential character. The frequency of dry years is over 40%.

They are common drought periods, of 10-14 days, in May-June, and of about 30 days or longer at the beginning of spring and especially at the beginning of fall. The duration of sunshine is of 2,165 hours multiannual average (Partal, E., Zaharia, G.V., 2008).

The research objectives aimed at optimizing culture technology in order to achieve maximum and constant sunflower yield, in the soil and climate conditions of southern Romania, also following the economic efficiency and environmental protection.

Due to its high oil content in seeds commonly exceeding 48-50% of the dry substance, sunflower is a typical oleaginous plant, whose economic value derives 80% of its edible oil (Bîlteanu, Gh., 2003).

Materials and methods

Research were performed in the experimental field of Systems of Sustainable Agriculture and Crops Fertilization (SSA-CF) not irrigated version, from NARDI Fundulea, pursuing the influence of density and fertilization on the harvest quality of three sunflower hybrids (a1 – Performer; a2 – KWS Barolo RO; a3 – PR64A89).

Concerning the plant density they were used two variants, c1 of 50,000 plants/ha, and c2 of 60,000 plants/ha.

An important influence factor was the soil. Experimental conditions in the area are characterized by the transition from steppe to forest steppe that mostly allows the formation of cambic chernozem soil category. Humidity higher than in the steppe led to a proliferation of the clay formation. So, a large part of the clay content from the A level migrated towards the limit between levels A and B.

Humus content is higher in the first 15 cm due to the former beds of leaves and gradually decreases towards depth (Partal, E., Zaharia, G.V., 2008).

Total nitrogen content (Nt) is generally high (0.18 – 0.13 %), as well as the total phosphorus (0.018%). Usually the cambic chernozem, cultivated longer, it is found a significant decrease in humus and nitrogen content of the arable layer. The level A extends to a depth of 45 cm, being followed by the level AB and B.

Since the bulk of sunflower roots develop to depths of 70 cm, only these levels have a direct influence on crop (Tabără, V., 2009).

» Ap (0-18 cm): clayey-dusty loam of very dark brown-gray color in the dry state; moist and friable in the wet state; rough in the dry state; moderated compact; gaps and frequent fine pores; frequent thin roots; straight smooth transition.

» Aph: (18-30 cm): clayey-dusty loam; same color as the previous chernozem; compacted; deconstructed (substantial); right wet, with scrap of fine roots; flat straight cross.

» Am (30-45 cm): clayey-dusty loam of very dark brown-gray color in wet state and dark gray in wet state; moist; medium sub-angular grains and polyhedral structure, well developed; friable in the wet state; rough in the dry state; loose; infrequent gaps; frequent fine pores; frequent fine roots; gradual, curled transition.

» AB: (45-62 cm): clayey loam (clay clayey-dusty- dusty clay) very dark brown gray in wet state and brown in dry state; damp; medium sub-angular polyhedral structure, well developed; friable in the wet state; rough in the dry state; rare gaps; frequent fine, medium pores,; frequent thin roots; gradual, curled transition.

» Bv1(62-82 cm): clayey loam (clay clayey-dusty); dark brown in wet state and brown in dry state; damp; medium sub-angular polyhedral structure, well developed; brittle-hard in the wet state; rough in the dry state; infrequent gaps, fine, frequent pores; thin, scarce roots; gradual transition, curled.

Concerning the porosity, the ratio pores filled with water / pores filled with air, it is very favorable, being ranged between 0.9 and 1.1 on the depth from 30 to 130 cm. In the layer of 0-30 cm prevails the water, while below 130 cm the substrate is little altered and the aeration is higher.

The soil penetration resistance is lower in the plowed layer (28 kgf/cm^2) and below this depth increases to 37 kgf/cm^2.

The main physical, hydrological and chemical properties of the soil are given in Table 1.

The highest content of humus of 3.0% is found in the layer of 0-30 cm and falls suddenly to 2.4% in Am. Next, along the profile, amount of humus gradually decreases. The soil reaction is slightly acid at the surface, then neutral, and then gradually moves to slightly alkaline with the maximum pH value of 8.2, due to the presence of large amounts of calcium carbonate. The total cation exchange capacity has high values and shows a very good representation of the complex soil absorption (clay + humus). Soil nutrient supply is very good.

Soil structure is glomerular, in the layer A shows in higher proportion stable aggregates. In the layer B aggregates begin to grow, the structure evolving towards shaped nut or prismatic structure. The ability of the capillary is 39%. Good permeability in layer A becomes poor in layer B due to the clay texture.

The experimental diagram is three factorial type, 3 x 3 x 2, ordered in three repetitions by the method of subdivided parcels. The experimental results were statistical processed using the variance analysis method (Gologan, I., Dornescu, A., 1981).

The experiment was located on uniform land in terms of fertility and landscape, on a chernozem soil, specific for the experimental area. The previous crop was wheat in all experimentation years.

The total experimental area was of 11,760 m2. The total surface for the experimental plot was 168 m2, and harvested area of 112 m2.

In order to organize the experiment it was used biologic material consisting of 3 sunflower hybrids. Plants cultivation was performed in optimum technological conditions, specific to the cultivation area, the studied genotypes comprising three hybrids: Performer (control – semi-late hybrid), Barolo RO (semi-late hybrid), and PR64A89 (semi-late hybrid).

Results and discussions

Alongside soil peculiarities, climatic features of the agricultural year 2012 directly influenced the results of experiments.

Evolution of climatic data was recorded throughout the agricultural year 2012. Distribution of rainfall and temperature evolution have been analyzed in stages meeting the requirements of sunflower crops (i.e. the active growing season, accumulation and maturity), for better correlation with agrophytotechnical issues watched in experiments. The agricultural year 2012 showed the following characteristics:

- rainfall in the winter was satisfactory, following the average (Table 2);
- winter months were colder than the annual average by 1.6 respectively 6.4ºC (Table 3);
- snow greatly reduced the impact of frost, so direct frost damages were relatively low;
- rainfall balance was unbalanced in March and April, when the rains were below the multiannual average with a difference of minus 13.0 – 26.8 mm per month (Table 2);

Tabel: 1

Main physical, hydric, and chemical properties of cambic chernozem soil from Fundulea (by Dumitru Elisabeta, 1997)

Properties / Depth (cm)	Layers								
	Ap	Aph	Am	A/B	Bv1	Bv2	Bv3	CnK1	CnK2
	0-18	18-30	30-45	45-62	62-82	82-112	112-140	149-170	170-200
Coarse sand (2-0.2 mm)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fine sand (0.2-0.02 mm)	28.1	28.0	26.2	28.1	29.8	29.7	32.2	34.5	39.7
Dust (0.02-0.002 mm)	33.1	34.2	33.8	32.1	32.5	35.0	35.0	33.2	29.8
Clay (<0.002 mm)	38.8	37.8	40.0	39.8	37.7	35.3	32.8	32.3	31.0
Physical clay (< 0.01 mm)	53.8	52.8	55.5	53.6	52.4	51.3	49.7	46.8	44.6
Texture	LL	LL	LL	LA	LA	LA	LA	LA	LA
Bulk density g/cm3	1.19	1.40	1.41	1.44	1.44	1.44	1.44	1.32	1.36
Total porosity %	56	48	48	46	46	46	46	51	49
Aeration porosity %	18	12	13	10	11	11	11	15	15
Degree of compaction %	-9	6	7	11	10	9	9	-1	2
Wilting coefficient %	11.9	10.9	11.9	10.8	10.3	9.4	8.8	9.0	8.5
Field capacity %	32	26	25	25	24	24	24	27	25
Hydraulic conductivity mm/h	21.1	15.6	16.1	12.2	10.4	17.8	12.2	20.0	7.8
pH (in water)	6.3	6.5	6.8	7.2	7.2	7.2	7.4	8.1	8.2
Humus %	3.0	3.0	2.4	2.1	1.5	1.2	0.9	0.8	0.6
C:N	11.4	11.8	10.8	10.1	-	-	-	-	-
N_t %	0.18	0.17	0.15	0.14	-	-	-	-	-
P_2O_5 total %	0.08	0.07	0.06	0.04	-	-	-	-	-
P_2O_5 movable ppm	28	14	3	3	-	-	-	-	-
K movable ppm	98	87	108	108	-	-	-	-	-
Exchange bases me/100 g soil	18.8	18.9	19.4	19.7	19.2	18.1	17.4	16.7	14.7
Degree of base saturation %	89.1	88.7	95.1	93.4	96.0	96.3	97.6	100	100

Tabel: 2

Monthly evolution of rainfall recorded in 2012

Month / Year	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Amount
2012	73.5	42.2	4.8	35.1	159	20.7	2.0	43.8	49.1	30.8	9.4	87.9	558.8
Average (40 years)	30.0	32.1	31.6	48.1	67.7	86.3	63.1	50.5	51.0	40.1	44.0	44.0	588.5

Tabel: 3

Monthly evolution of the temperatures recorded in 2012 (^{o}C)

Month / Year	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Average
2012	-1.4	-7.3	5.5	14.2	18.0	23.3	27.3	27.8	22.0	13.9	6.8	-1.9	
Average (40 years)	-3.0	-0.9	4.4	11.2	16.5	20.2	22.1	21.1	17.5	11.1	5.0	-0.4	11.6

- water deficit increased in June and July, reaching a maximum in August;
- lack of rainfall in the June-August period was associated with high temperatures, which led to heat and drought phenomena;
- average monthly temperatures for the year 2012 placed themselves over the average of 40 years annual values (Table 3);
- highest positive temperatures were recorded in June, July and August 2012;
- heat together with the plants physiological consumption led to the intensification of sunflower stage evolution, so they registered leafage depreciation or yellowing phenomena, and drying in the basal, small capitulate, and raising of the sterile plant percent.

» Field observations and measurements:
- determination of production (kg/ha) obtained by extrapolating the experimental plot harvest;
- taking pictures of plots in various stages of culture;
- sampling for laboratory tests;
- reading the daily weather data throughout the vegetation (average temperature, precipitation, relative air humidity, and wind speed).

» Laboratory determination:
- removing impurities from the seed samples;
- 1000 Grain Weight, determined from harvested seed per plot;
- Hectoliter mass (HM), weighing average of two samples per plot;
- oil content etc.

Hectoliter mass (HM) is listed as a factor quality assessment, so a high hectoliter mass indicates a seed of high quality and it is the ratio between mass in kilograms and volume in hectoliters, determined for any kind of grain by measuring with a device and a method consistent with the national provisions (Muntean, L.S., 1997). 1000 Grain Weight is a very significant productivity element because it depends on the size of the embryo, the amount of germination, and emergence reserve substances. 1000GrainWeight is closely related to yield because varieties having large grains may have a greater yielding capability (Muntean, L.S., 1997).

Conclusions

Primary processing data was accomplished in September 2012, following the weighing of crops from each variant. It consisted in the removal of studied repetitions, achieving average per variation, then reduction of losses and impurities and reporting at the surface unit. Variance analysis emphasizes which of the factors or combinations is more significant in statistical terms, to which will be added the practical or scientific significance of those factors.

Data processing was performed following the laboratory analysis of the sunflower seeds, yielded as samples of 750g. After removing the impurities they were set the 1000GrainWeight, HM, and seeds oil content.

During the agricultural year 2012 it was registered the drought phenomenon, due to poor distribution of rainfall together with high thermal conditions throughout the growing season which led to the development of lower 1000GrainWeight values.

The highest HM and 1000GrainWeight values were registered at the variant fertilized with manure (20 t/ha) and a density of 50,000 plants/ha (Figure 1).

The most favorable values were obtained from the hybrids PR64A89 and Performer, where HM was of 38 kg/100 l, respectively of 37 kg/100 l, 1000GrainWeight of 54.7 g, respectively of 55.5 g.

From the analysis of these data, we can conclude that, in terms of a year with uneven

distribution of rainfall in time and space, a variant yielded the best values of quality indicators is that fertilized with manure (20 t/ha) where it was used the hybrid PR64A89 (Figure 1).
The influence of environmental factors and culture conditions is strongly felt concerning the quality level of sunflower yield, namely in the accumulation of oil in the seeds. Below is shown a range of data on quality indexes of sunflower crops, considered as the average of the first year of the experiment.
Sunflower is one of the most important oil producing crop. Hybrids currently contain in fruits (achenes) between 43 and 53% oil. Data analysis on the influence of hybrid plant fertilization and the density concerning the oil content of seeds is shown in Figure 2. Oil content in 2012 ranged between 36.8% and 43.9% and according to our laboratory data is considered poorer in terms of quality. The highest oil contents registered the hybrids PR64A89, Performer, and then Barolo RO, but the variation is low (0.2 – 8.2%), depending on the studied technological variant and evolution of culture climatic conditions in 2012.

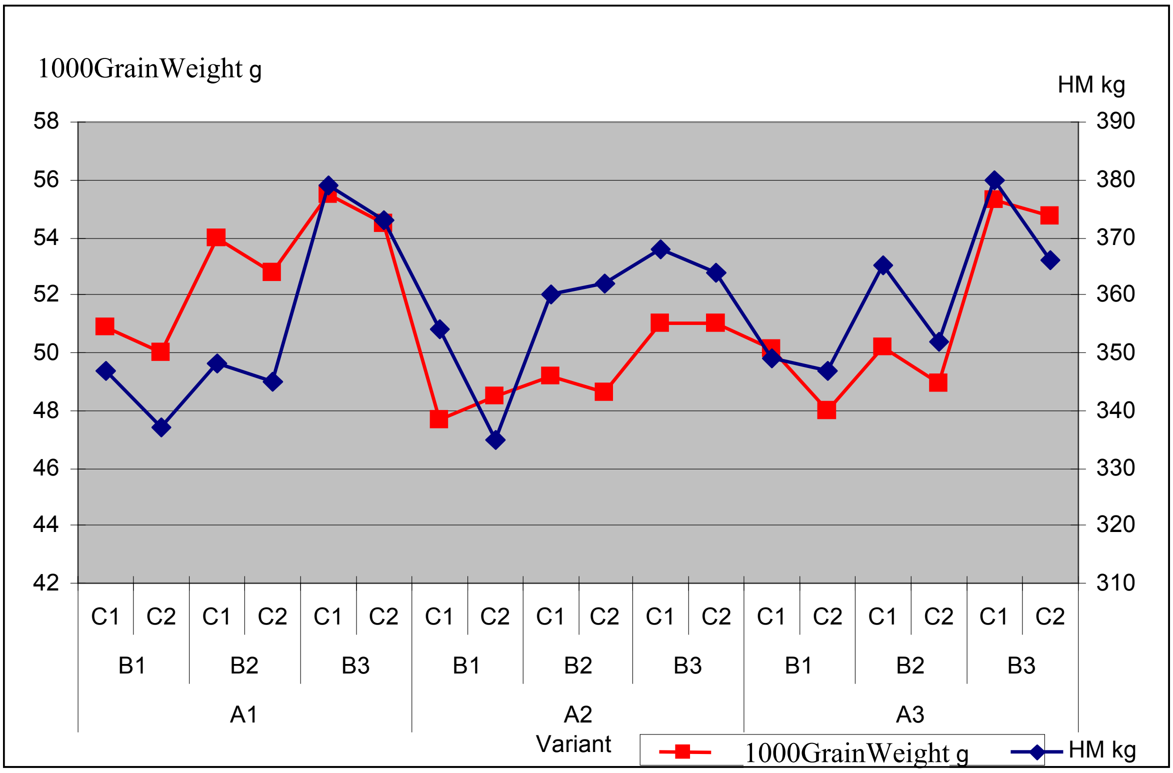

Figure 1. Influence of the hybrid, plant fertilization, and plant density on the quality parameters 1000GrainWeight and HM

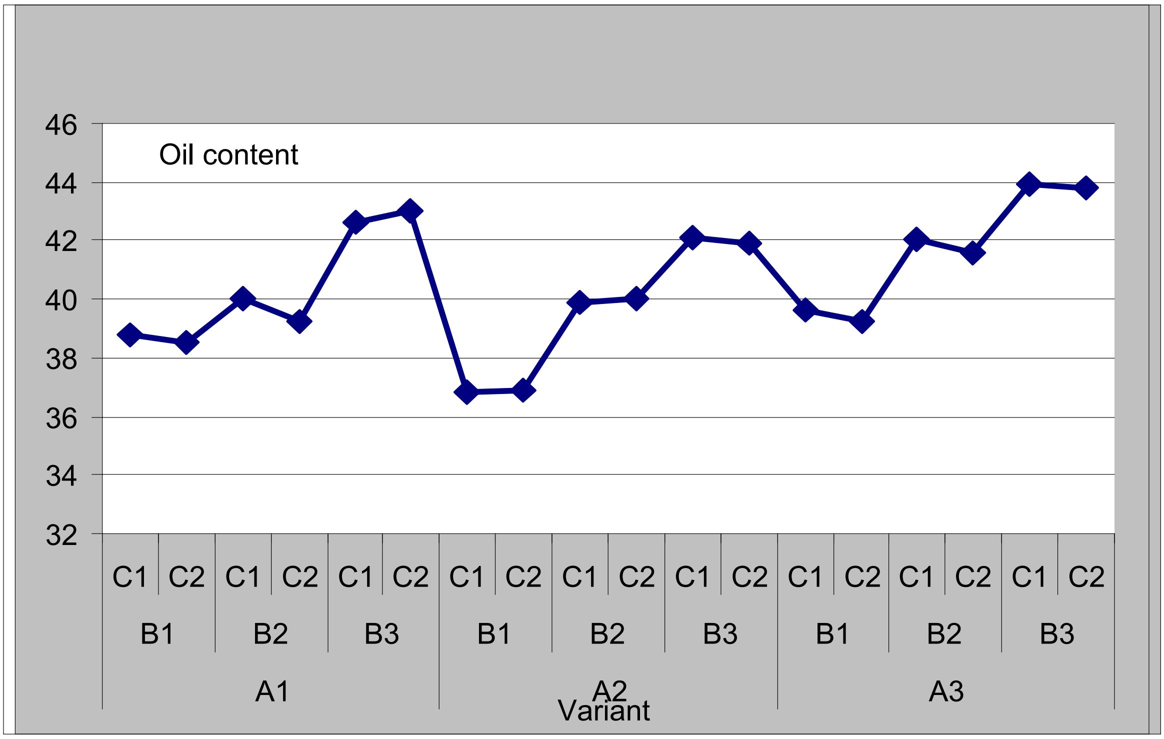

*Figure 2.*Influence of the hybrid, plant fertilization, and density on oil content (%)

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RESEARCH ON THE BEHAVIOR OF SOME MAIZE HYBRIDS (ZEA MAYS L. CONVAR. DENTIFORMIS) UNDER THE INFLUENCE OF TECHNOLOGICAL LINKS AT FUNDULEA, CĂLĂRAŞI COUNTY

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Abstract: *The main aim of this research theme is to determine the best maize hybrids (Zea mays L. convar. Dentiformis) suitable for the southern area of Romania, that in terms of applying the most appropriate technological links to determine the achievement of high and stable yields. Crop management developed using optimal technology, specific to the site of culture in not irrigated variant, the studied genotypes consisting in two Romanian hybrids: Partizan and Opal. The experiment was located on a uniform land in terms of fertility and landscape, on a chernozem soil, in an experimental field belonging to NARDI Fundulea. The experimental results were statistically processed using the variance analysis method. Conclusions consist of variance analysis on the influence of soil tillage, fertilization, and use of hybrid in maize crop in terms of the 2012 climate.*

Key words: *zea mays, technological links, yield*

Introduction

Plant of maize (Zea mays) is the most surprising system nature has for energy storage. From a seed weighs about one third of a gram, rise and develop in about 10 weeks a plant 2 meters high, and after only eight weeks it will produce 600-1000 grains. Due to the chemical composition of all its parts, maize is of a great agricultural significance, being basic forage in feeding and a valuable raw material for human nutrition.

Achievement of maize crops concerning reliable quantitative and qualitative yields depends on ensuring and compliance with all technological links (Bîlteanu, 1989).

The main technological parameters are:
- location of culture;
- fertilizer application;
- irrigation;
- soil tillage;
- seed and sowing (planted hybrid, optimum density, sowing period);
- culture management (control of weeds, pests and diseases).

The experiments aimed primarily the behavior research on maize hybrids under the influence of various technological sequences, in the soil and climate conditions from southern Romania. In order to find out the optimal technology of maize crop management it was investigated how it reacts to different tillage methods on different fertilization agro funds, different hybrids, as well as the interaction of these factors.

It has also followed how maize crop behaves in terms of quality and efficiency parameters.

Materials and methods

Observations and determinations were performed in the experimental field of agricultural technology from NARDI Fundulea, Călăraşi County, in not irrigated system. Given the importance of maize and local climatic conditions, it was organized a group for the study of the experimental maize crop productivity and quality in natural conditions. The experiment was located on a uniform land in terms of fertility and landscape, on a chernozem soil.

area was of 7,056 m2, the surface of a whole experiment was 168m2, and the yielded area was 112 m2. Influencing factors and variations of these factors were the following:

A. soil ground tillage

A1 – autumn plowing;

A2 – spring plowing;

A3 – disking.

B. nitrogen and phosphorus fertilization

B1 – N0P0;

B2 – N120P70.

C. studied hybrids

C1 – Partizan;

C2 – Opal.

The experimental module was three factorial, placed according to subdivided parcels method in three repetitions 3 x 3 x 2.

The experimental results obtained were statistically processed using the variance analysis method.

The location of crop was done within 4-year crop rotations, ensuring this way a significant reduction of harmful pathogens and weed infestation (Sin Ghe., Pintilie C., 1975).

For that purpose they were organized plots sized to provide the efficient use of mechanization and the diversification of rotation with higher possibilities to adapt to any changes in cropping patterns. In crop rotation, maize followed wheat crop.

In the experiment it was used biological material consisting of Romanian maize hybrids, both obtained at NARDI Fundulea. These hybrids meet the culture area and new technologies, being well known that the use of genotypes without an accurate technology cannot provide production and quality performance, and without a valuable genotype best part is lost from the effectiveness of new technologies implementation. Romanian hybrids analyzed were Partizan and Opal, having the following features:

» **Partizan.** Simple hybrid, semi-erected leaves, red rachis, yellow grains, a middle vegetation period, approved and registered in 1998.

Zoning: is suitable for cultivation in the plains of the south and west of the Romania, in plateau or hilly areas surrounding them.

Vegetation period: 130 days from sowing to maturity, FAO 470 – 480.

Description: The plant is robust, relatively high with an average height of 245 cm and 101 cm from the ground surface to maize cob insertion.

Cob is well developed, 18 cm length, 4.3 cm middle diameter, 14 to 16 rows of grains, an average weight of 188 grams and a grains efficiency of 84%. Grains are dentate, 1000GrainWeight of 280 g, and average protein content of 10,36% , starch 71,97 %, and fat 4,32 %, good for fast drying (*Varieties/hybrids Official catalog of Romania, 2010).

Physiological characteristics: Good resistance against drought, heat, grains shriveled, and against fall and breakage of stems.
Specific agronomical requirements: optimal plant density is 50,000 plants/ha not irrigated, and 70.000 plants/ha irrigated.
Economic efficiency: in normal crop management conditions the yield of non-irrigated was 7,200-10,350 kg/ha, and the irrigated 11,100-15,100 kg/ha, in terms of 3 years average yield. The highest yields were of 11,500 kg/ha not irrigated and 16,840 kg/ha irrigated.

» **Opal.** Simple hybrid, semi early, yellow-orange grains and smooth teem, homologated 1994.
Zoning: is suitable for cultivation in the plains and plateau in the south and west and hilly areas from the south of Romania.
Vegetation period: 131 days from sowing to maturity, FAO 420 – 430.
Description: The plant is vigorous, relatively short, semi-erected leaves, red rachis, with an average height of 255 cm and 106 cm from ground surface to maize cob insertion. Cob is large, cylindrical, with an average length of 20.5 cm, thickness of 4.2 cm, weight of 240 g, 14-16 layers of grains and grain efficiency of 84%. Grains are dentate, 1000GrainWeight is 336 g, and average protein content is 12.0%, starch 71.90 %, and fat 4.32 %, good for fast drying (Sarca et all 1995).
Physiological characteristics: it has a good resistance against drought, heat, stems falling and breakage at maturity, as well as against the attack of European Maize Borer (Ostrinia nubilalis).
Specific agronomic requirements: optimal density not irrigated - 50,000 plants/ha, and 70,000 plants/ha -irrigated.
Economic efficiency: in normal culture conditions, not irrigated average grain yield is of 10,000 kg/ha (plain area), 8,500 kg/ha (hilly area), and 15,000 kg/ha irrigated area.

Results and discussions

Processing of primary data was performed in 2012, by weighing each variant yield. It consisted in the removal of studied repetitions, obtaining the average per variant, then loss and impurities reduction, and reporting at surface unit.
In the same time researching the influence of several factors on production poly factorial experiments allow to study both the influence of each factor separately, and their combined effect application (Gologan, I., Dornescu, A., 1981).
So, the analysis of variance in the experiment of the influence of soil tillage, fertilization, and the maize hybrid yield is shown in Table 1, where can be seen both the significant differences for each of the three factors and the interaction between them, respectively tillage x hybrid, fertilization x hybrid, and tillage x fertilizer x hybrid.
Influence of soil tillage on maize yield in term of 2012 can be found in Table 2.
Influence of fertilization on maize yield in terms of 2012 is found in Table 3.
The application dose of N120P70 fertilization in maize, it leads to a yield of 4,543 kg/ha comparing to the not fertilized control variant where it was obtained a yield of 3,327 kg/ha. Nitrogen and phosphorus fertilizer application resulted in obtaining a yield increase of 1,216 kg/ha, considered as very significant.

Tabel: 1

Variance analysis at the poly factorial experiment of 3x2x2 type on the influence of tillage, fertilization, and hybrid over the maize yield

Variant	SP	GL	S^2	F_C	Ft		Signification
					5%	1%	
A	935.2	2	467.60	25195.0	6.94	18.00	**
E_A	0,07	4	0.02				
B	1331.0	1	1331,0	********	5.99	13.74	**
A x B	115.2	2	57.60	5892.1	5.14	10.92	**
E_B	0.06	6	0.01				
C	69.7	1	69.70	6565.2	4.75	9.33	**
A x C	15.7	2	7.86	740.1	3.88	6.93	**
B x C	0.30	1	0.30	28.4	4.75	9.33	**
A xBxC	2.04	2	1.02	96.2	3.88	6.93	**
E_C	0.13	12	0.01				

Tabel: 2

Analysis of soil tillage influence on maize yield (kg/ha)

Variant	Yield	%	Difference	Signification
A_1 - Autumn plowing	4534	100		
A_2 - Spring plowing	3982	88	-553	ooo
A_3 - disking	3288	73	-1250	ooo
LSD 5%=150 LSD 1%=260 LSD 0.1%=480				

Tabel: 3

Analysis of fertilization influence on maize yield (kg/ha)

Variant	Yield	%	Difference	Signification
b_1-not fertilized	3,327	100	Control	-
b_2-$N_{120}P_{70}$	4,543	136	1,216	***
LSD 5%=80 LSD 1%=120 LSD 0.1%=200				

Tabel: 4

Analysis of soil tillage on maize production depending on fertilizer and hybrid (kg/ha)

Variant	b_1- not fertilized				b_2-$N_{120}N_{70}$ kg a.i./ha			
	Yield kg/ha	Diff.	%	Signification	Yield kg/ha	Diff.	%	Signification
C_1-Partizan								
A_1 – Autumn plowing	3,830	Control	100		5,330	Mt	100	
A_2 – Spring plowing	3,410	-420	89	oo	4,933	-396	92	oo
A_3 - disking	3,130	-700	81	ooo	3,810	-1,520	71	ooo
C_2-Opal								
A_1 – Autumn plowing	3,820	Mt	100		5,157	Mt	100	
A_2 – Spring plowing	3,037	-783	79	ooo	4,547	-610	88	ooo
A_3 - disking	2,733	-1086	71	ooo	3,480	-1,676	67	ooo
LSD 5%=220 LSD 1%=340 LSD 0.1%=570								

Tabel: 5

Average yields obtained (kg/ha)

Variant		C_1 – Partizan	C_2 - Opal	Yield
A_1 – Autumn plowing A_2 – Spring plowing	B_1-not fertilized	3,830	3,820	3,825
	B_2-$N_{120}P_{70}$	5,330	5,157	5,243
A_3 - disking A_1 – Autumn plowing	B_1- not fertilized	3,410	3,037	3,223
	B_2- $N_{120}P_{70}$	4,933	4,547	4,740
A_2 – Spring plowing	B_1- not fertilized	3,130	2,733	2,931
	B_2- $N_{120}P_{70}$	3,810	3,480	3,645
Yield (average)		4,073	3,795	**3,934**

Tabel: 6

Comparisons between the experimental factors under analysis variations

Interaction of the experimental factors	LSD values		
	5%	1%	0.1%
Comparisons between the variations of factor A	150	250	480
Comparisons between the variations of factor B	80	120	200
Comparisons between the variations of factor C	70	110	150
Comparisons between the variations of factor A at the same variant of factor B	180	300	530
Comparisons between the variations of factor A at the same variant of factor B	110	160	240
Comparisons between the variations of factor A at the same variant of factor C	180	280	490
Comparisons between the variations of factor A at the same variant of factors B and C	220	340	570

Conclusions

From analyzing the data collected and presented in the climatic conditions of 2012, highest production of 4,534 kg/ha was obtained from version where has been used as basic ground work the autumn plowing.

Replacing this variant with spring plowing has reduced production by 553 kg/ha, the difference being highly significant. Also, the disking applied as a technologic link instead of autumn plowing caused a yield decrease of 1,246 kg/ha, difference being considered very significant.

A summary of results concerning the influence of soil tillage over maize yield depending on fertilizing and used hybrid is shown in tables 4 and 5.

Comparing averages factor A graduations (soil tillage), not fertilized or fertilized studied in the case of two hybrids (Partizan and Opal), it results that the highest yields are obtained in autumn plowing, fertilized (5,330 kg/ha, irrespectively 5,157 kg/ha).

By using the technological link of spring plowing and fertilization with N120P70, in terms of 2012, the average yield was lower than that of autumn plowing.

From the data submitted we observe a decrease of yields of both hybrids (Partizan and Opal) in the variants of spring plowing and disking, by comparison with the control (autumn plowing), having values assured as distinct and very significant, ranging from 420 to 1,370 kg/ha (Tables 5 and 6).

Noticeable is the experimental version on the ground soil tillage (disking), recording the highest loss of production compared to the control, ranging from 1,530 to 1,660 kg/ha. Concerning the hybrids response to the interaction of the studied factors, we can see a similar behavior of both hybrids, the yields being comparable.

In conclusion, given a relatively droughty year, due to uneven distribution of rainfall associated with high temperatures, maize crop management concerning the studied variants consists of seedbed preparation after autumn plowing as basic work, crop fertilizing with N120P70, and use of the Partizan hybrid.

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