RESEARCH REGARDING THE APPLICATION OF SUSTAINABLE TECHNOLOGIES TO THE SUNFLOWER CROP UNDER THE PEDOCLIMATIC CONDITIONS FROM BANAT

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Abstract. *The research referred to the implementation of some sustainable crop technologies to sunflower and monitoring the production capacity of a sunflower hybrid variety, with high oleic acid content, and also with a series of characteristics like: good stability, breakage resistant, good centre seed coverage, ideal calatidium angle, high resistance to diseases and orobanche parasite plants, good tolerance to the main sunflower diseases. The research was carried out at the Experimental Didactic Station Of the Banat University of Agricultural Science and Veterinary Medicine "King Michael 1st of Romania"form Timisoara, on a cambicchernozem soil type, slightly gleyic, slightlydecarbonatedand aimed at testing some hybrids and optimising some technological linksin order to obtain economical yields of superior quality. The experiments were of the comparative crop type, after the strip method, with three repetitions. Production results underlined the fact, that even in the low precipitation conditions of the year 2017, yields ranging from 3000- 3500 kg/ha can still be obtained.*

Key words*:sunflower, technology, pedoclimatic conditions*

INTRODUCTION

Due to the growing consumption of vegetal oil at global level, but also due to the new tendency to use it for energy production, the focus on vegetal oil producing plants as well as the cultivated surfaces are also growing (IMBREA FL, 2014). This tendency can also be observed in our country in the case of the sunflower crop. The precipitation irregularity during the vegetation period, growing yearly, manifestedin the western part of the country, where the sunflower crop occurs in conditions of great climatic favourability, leads to the necessity of research regarding hybrid behaviour, welcome information for sunflower cultivars from the researched area. On the other hand, agricultural technology sustainability can represent a way to meeting current needs, without limiting future generations from satisfying their own needs (IMBREA FL, 2014). In other words, this translates to the exploitation of natural resources to the point where it does not lead to their reduction.

MATERIALS AND METHODS

The research was carried out on a chernozem cambic soil, slightly gleyic, slightly carbonated (figures 1 and 2) at the Experimental Didactic Station of the Banat University of Agricultural Sciences and Veterinary MedicineKingMichael the 1st of Romania from Timisoara. The experiments were of the comparative crop type, after the strips method, with three repetitions.

The biological material was represented by the NK Neoma hybrid, a semi-early hybrid with a high and stable yearly production potential and NK FERTI, a semi-early hybrid with

demonstrated yield and potentialinthe conventional High Oleic technology, with a good drought tolerance.

The sunflower crop was included in a 4 year drop rotation system (autumn wheat, raps, maize andsunflower). The basic soil work was a 28 cm furrowing after land clearing,and in spring the preparation of the seedbed with the cultivator, in order to preserve as much water as possible in the soil. Seeding was carried out during the last days of March with a density of 55 000 germinable seeds/m^2.The distance between rows was of 70 cm, and the seeding depth of5 cm, with a 3.5kg/ha seed quantity.

Fertilising was undertaken by applying complex $N_{20}P_{20}K_0$ type fertilisers. At the same time as the seeding, with a SPC 6seeder, equipped with chemical fertiliser applying devices. The active substance product dose was of 16.8 kg/ha, using a quantity of 84 kg/ha commercial product. We would like to mention the fact that the fertilisers were applied only to the plant row, thus increasing their efficacy. If we were to calculate the fertiliser dosage the plants benefit from only in the row area, then it would amount to 50.4 kg/ha active substance. During vegetation foliar fertilisers were applied, of NPK type + microelements. We chose the fertilising variant Agrofeed foliar fertiliser, which contains N19P19, and from the microelements 2 % Mg +B. The application was carried out with the herbicide machine MET, which covers 13 intervalsbetween rows in one passing. A mixture of 4 kg commercial substance in 220 l water was created.

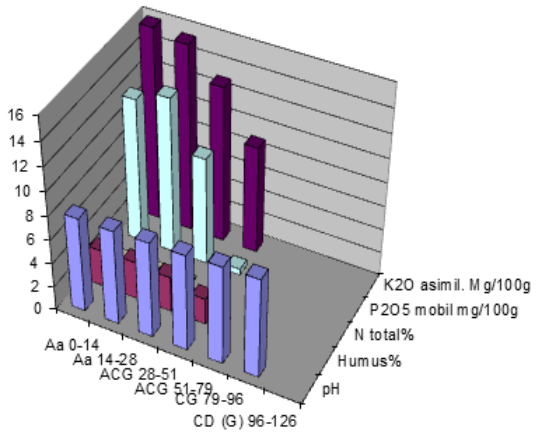

Figure 1. Results of soil chemical analysis in experimental field

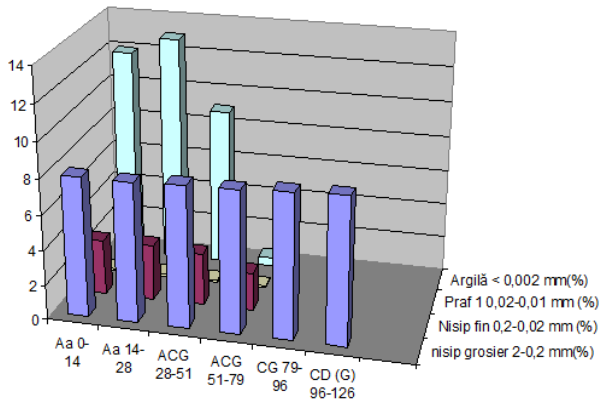

Figure 2. Results of soil physical analysis in experimental field

RESULTS AND DISCUSSIONS

Results regarding stem length in 2017are presented in table 1.

For this parameter, the plant height on a 10 m/ row length was measured in a sunflower crop area, with normally developed plants, measuring the distance from the soil surface level to the calatidium superior part.

Table 1

Results regarding stem length in 2017

Hybrid	Stem length (cm)	%	Difference cm	Significance
NK Neoma	149.1		1.65	Xx
Field average	147.45	100		
NK FERTI	145.9		-1.65	00

DL 5 % = 0.6 cm;
DL 1% = 1.23 cm;
DL 0.1% = 2.19 cm.

The results show that in 2017, even though it was a droughty year, plant height did not register significant differences between hybrids, as well as compared to the height established by the improver.

Results regarding stem weight in 2017,are presented in table 2. As one may observe, with hybrid NK Neoma, which registered the greatest plant height,the highest weight is also observed.

Table 2

Results regarding stem weight in 2017

Hybrid	Stem weight (g)	%	Difference g	Significance
NK Neoma	82		3.65	Xxx
Field average	78.35	100		
NK FERTI	74.7		-3.65	000

DL 5 % = 0.9 g;
DL 1% = 1.45 g;
DL 0.1% = 2.51 g.

Table 3 shows results regarding achene calatidiumweight, in 2017.

Table 3

Results regarding achene calatidium weight, in 2017

Hybrid	Achene calatidium weight (g)	%	Difference g	Significance
NK Neoma	86.5		-1.865	000
Field average	88.36	100		
NK Ferti	90.23		1.865	Xxx

DL 5 % = 0.3 g;
DL 1% = 0.97 g;
DL 0.1% = 1.76 g.

The highest values were registered with the NK Ferti hybrid, of 90.23 g, higher than 1.865 g registered with the NK Neoma hybrid.

Results regarding the weight of calatidium achene in2017,are presented in table 4.

Table 4

Results regarding the weight of calatidium achene in 2017

Hybrid	Calatidium achene weight (g)	%	Difference g	Significance
NK Neoma	55.38		-5.565	000
Field average	60.945	100		
NK Ferti	66.51		5.565	Xxx

DL 5 % = 1.37 g;
DL 1% = 2.97 g;
DL 0.1% = 3.96 g.

As was the case with the calatidium weight, the highest values regarding the calatidium achene weight were registered with the NK Ferti hybrid, of 66.51 g, higher than 5.565 g observed with the NK Neoma hybrid.

The yield results of 2017, obtained in comparative crop with 2 sunflower hybrids are presentedin table 5.

Overall, the yields produced in 2017 can be appreciated as high, the studied hybrids proving adaptability to the research area.The harvest levels for the two experimental hybridswere placed over the 3000 kg/havalue,and the experimental field average overthe 3351 kg/ha level.

Table 5

Crop results obtained in comparative culture, in 2017

Hybrid	Crop Kg/ha	%	Difference Kg/ha	Significance
NK Neoma	3045		-306.5	000
Field average	3351	100		
NK Ferti	3658		306.5	Xxx

DL5 % = 99 kg/ha;
DL 1% = 178 kg/ha;
DL 0.1% = 264 kg/ha.

CONCLUSIONS

In the western part of the country, from a climatic point of view, especially regarding precipitations falling during the vegetation period, the year 2017was an atypical one.

However, results showed a good reaction of the experimental hybrids to the drought conditions, with a very good production capacity, even under these conditions, demonstrating resistancetodiseases and pests.

The level of the obtained yields was situated around the 3000 - 3500 kg/ha values, which, corroboratedwith the technological investment value and the capitalization price, insures economic efficaiency for the reference area.

BIBLIOGRAPHY

CRISTA F. Conservarea fertilitatii solului si managementul nutrientilor,Ed. AGROPRINT,ISBN 978-606-8037-72-1, 2014

GROSZ D, BORCEAN I, TABARA V, IMBREA FL, MARIAN FL., Researches Regarding the Interaction Between Cultivating Variety–Fertilized–Planting Distance Between Rows at the Oilseed Rape, Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Agriculture, 2011

DAVID GH., PÎRSAN P., IMBREA FL., Tehnologia plantelor de camp [Field Plant Techology], EdituraEurobit, Timișoara, 2003

DICU D, PÎRȘAN P, MARINKOVIĆ B, IMBREA F, MIRCOV V - Influence of low frequency electromagnetic radiation on sunflower seeds germination., Research Journal of Agricultural Science, 2015

DICU D, PÎRȘAN P, MARINKOVIĆ B, IMBREA F, MIRCOV V Effect of low frequency electromagnetic radiation on humidity and weight characteristic of corn and sunflower seeds, Research Journal of Agricultural Science, 2015

IMBREAFL, Tehnologii integrate, EdituraEurobit, Timișoara, 2014

IMBREA FL., JURCOANE STEFANA, POP GEORGETA, IMBREA ILINCA M, BOTOS L, CRISTA FL, SMULEAC LAURA, Valorising municipal sludge as fertiliser in Camelinasativa (L.) Crantz, Romanian Biotechnological Letters, 2017

PIRSAN P, IMBREA F, BOTOS L ,Cultivating sunflowers in the "Permanent Vegetal Cover" syste*m*, Journal of Biotechnology, 2015

POP GEORGETA, ALEXA ERSILIA, IANCU T., IMBREAFL, LAZA A., Study on the Influence of Soil and Fertilization on Amino Acid Content in Oil Linen, REVISTA DE CHIMIE, 2017

POPA, M ; LATO, A ; CORCHES, M ; RADULOV, I. ; BERBECEA, A ; CRISTA, F ; NITA, L ; LATO, KI; POPA, D Quality of some soils from the west region of Romania,Agrolife Scientific Journal,Volume: 5 Issue: 1 Pages: 174-177, ISSN 2286-0126, 2016

ȘMULEAC LAURA, ONCIA SILVICA, IENCIU ANIȘOARA, BERTICI R., ȘMULEAC A., PIȚIGA C, A study of the possibilities of using groundwater in rural communities in south-western Banat Plain, Research Journal of Agricultural Science, vol. 45, No 2, Timișoara ISSN:2066-1843, 2013

V.ȘURLEA. S.BĂTRÎNA , F. CRISTA, ISIDORA RADULOV , Research on application of fertilising resources on some cereal and oil seeds crops- -Research Journal of Agricultural Science 48 (4), 164-169, ISSN 2066-1843, 2016