THE NATURAL PRODUCTION POTENTIAL OF SOIL FROM S.C. DM AGROLUGOJ S.R.L. BARA MUNICIPALITY, TIMIȘ COUNTY

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Abstract: *The aim of the work is to obtain a fund of information on the characteristics of the natural environment, of the soils in the area in particular, with zonal selling characteristics, which in fact define the structure of the land fund and the state of soil quality, in order to establish the ecological specificity of the land's productivity possible pressures on them. The theme is, because it derives from the fact that it is different soil qualities from another territory, which are specific to the factors and conditions of formation and evolution of private soils as a very complex ecological system. The research of consciousness in the application of the data area regarding the development of some agricultural components of the productive land related to the cosmic-atmospheric and telluric-edaphic supply necessary for the foundation of some current cultural technologies or to create the soil for their effective use through a complex and approach to physical conditions geographical and climate-edaphic in the contact zone between the high plain of Banat and the Lipova Hills. Considering these aspects regarding the existence due to various manifestations of natural factors or irrational human interventions, the work towards the authors to seek to transfer descriptive theoretical activities to analytical ones that offer practical solutions in the sustainable management of edaphic resources. The research is based on the establishment of a sustainable agriculture system, meeting the requirements for the establishment of the scientific database necessary for the establishment of technologies and for the development of measures for the integrated management of agroecosystems.*

Keywords: *soil, agricultural, economic values, potential production*

INTRODUCTION

The soil is has an particular importance not only in agriculture but in general, it is one of the resources necessary for the existence and productive activities of mankind.

As a means of production in agriculture, the soil differs from other means of production, being limited in the geographical space and requiring a rational use (ȚĂRĂU, ET AL., 2005, 2022).

Of course, the soil cover, once formed, behaves as an autonomous entity, a system withpown personality, capable of self-development, but through its multiple reactions of energy-material exchange with the other shells, it still remains largely dependent on manifestation and the evolution of environmental factors, that the soil system is integrated as a subsystem in the geosystemic ensemble of the geographical environment (POSEA, GR. Et al., 1996; VRÎNCEANU, CALCIU I., 2000; IANOȘ, GH., ET AL., 1992; 1997).

Agricultural production is carried out under the influence of various environmental factors, modifies more or less, in relation to man's ever-increasing ability to change them (OKROS, A., ET AL., 2019). One of the long-standing concerns of researchers and practitioners has been to find the best indicators of environmental factors and conditions that most accurately express the favorability of plant growth and fruiting (ȘMULEAC, L., ET AL., 2021). All environmental factors have a very different spatio-temporal manifestation. The criteria and indicators for the characterization and division of homogeneous territorial areas must be distinct for each individual factor, condition or attribute, attributes that manifest themselves in a certain form and in a range of manifestation of the phenomenon both for the entire surface of

the Earth and and for the given geographical space (DAVID, G., ET. AL., 2018; RĂUȚĂ, C., 1995).

Knowing the relief is necessary to be able to appreciate the land as a whole, as an element that influences production, as well as to make possible correlations with other environmental factors related to the relief (in general, pedoclimatic and water conditions) (ȚĂRĂU ET AL., 2002, 2005).

The interaction of environmental and soil factors results in two trends, two approaches to the problem (NIȚĂ, L., ET AL., 2018, 2019). On the one hand, the totality of the soil characteristics generates the interaction in time and in a defined space the notion of fertility, and on the other hand the way in which all environmental factors are interconnected, to create an optimal state of vegetation, defines the notion of favorability (MIHUȚ, C., NIȚĂ L., 2018; MIRCOV, V. D., ET AL., 2021).

MATERIAL AND METHODS

The aim of the work is the study of the soil and water resources in the Bara area, Timiș county, in the current context in which we find ourselves, given the climate changes that increasingly influence the soil and water resources available in the studied area with repercussions on the entire evolution of plant development. Both soil and water are vital to our life and to the entire planet. If the two resources are insufficient, an imbalance of life on Earth would occur (ROGOBETE, GH., IANOS, GH., 2012).

The health of the soil and the purity of the water are essential to be able to talk about the quality of life, environmental factors (soil, water, climate, air, etc.) can influence the well-being and health of people (RĂUȚĂ, C., CÂRSTEA, S., 1993.

For the preparation of the paper, data obtained both from field observations and data taken from previous researches, OSPA Timiș and Bara Municipality Hall were used.

This paper is based on the selective evaluation of data from the specialized literature on the general and particular fundamental aspects regarding the formation, spread and use of soil and water resources in the studied area, in the current context in which we find ourselves.

Research methods were:

1. Regarding soil resources. I made a series of trips to the field, I made a series of observations on the area and compared them with previous studies carried out by various researchers and with those provided by OSPA Timiș and Bara City Hall, as well as from local residents.

2. Regarding water resources. I studied the specialized bibliography, a series of maps, descriptions and information related to the Bistra River, the main water course in the studied area and the influence and importance it has on the soils.

RESULS AND DISCUSSIONS

1.THE NATURAL FRAMEWORK OF SOIL FORMATION AND EVOLUTION IN BARA MUNICIPALITY, TIMIȘ COUNTY

1.1. Relief

From a geomorphological point of view, the perimeter of Bara commune is part of the large extracarpathian units located in western Romania, namely: the western hills and depressions, more precisely the Lipovei Hills.

From a geomorphological point of view, the studied perimeter is found in the Piedmont complex Lipovei Hills, which is part of the large morphostructural unit called the Lower Mureș Depression, the space between the Highiș-Drocea-Zărand Mountains to the north, the Transylvanian Depression to the east, the Poiana Ruscăi Mountains to the south and the Pannonian Depression to the west.

Morphologically, the Hills of Lipova appear as a succession of slightly inclined steps around a central plateau that descends slightly from over 400 m in the east to 180 m in the west, the entire region being torn by erosion, the hydrographic basins being more and more developed to the west. Thus, the relief steps located around the central plateau were transformed into long ridges separated by deep valleys.

1.2.Hydrography and hydrogeology

The researched area is part of the group of south-western hydrological systems, the Timiș - Bega hydrographic basin.

The main water course is the Miniș stream, which springs from the Lipovei Hills (10 km upstream from Secaș) and has a length of 26 km with a catchment area of 180 km2 which includes the entire researched perimeter.

The current hydrographic aspect completely different from that of the not-too-distant past is the result of important water improvement works started over 250 years ago.

Regarding the level of pedophreatic waters within the researched space, it is closely dependent on the meso- and micro-relief forms, the nature and depth of the hydro-geo-pedological horizons, the season, the amount of precipitation and the existing hydro-ameliorative works, these oscillating between 0.5 - 4 m in meadows and below 10 m within the plateaus. The depth sheets show values that increase from north to south from 4 - 9 m to 80 m deep and contain potable water, thus ensuring part of the household consumption requirements.

1.3.Climate

The microclimatic peculiarities of the researched area are determined by its geographical position, so it is characterized by a temperate continental climate with shorter and milder winters, frequently being under the influence of cyclone activity and air masses crossing the Mediterranean and Adriatic Seas. Its general features are marked by the diversity and irregularity of atmospheric processes.

The dominant air masses during spring and summer are the temperate ones of oceanic origin that bring significant precipitation. Frequently, even during the winter, moist air masses arrive from the Atlantic, bringing significant rain and snow, rarely cold waves.

From September to February, there are frequent intrusions of continental polar air masses coming from the east.

1.4. Anthropogenic influence

The most important changes are due to the replacement of natural vegetation by agricultural crops, damming, drying, drainage works, the use of mineral fertilizers and amendments, intensive soil works with mechanized means.

All these human interventions have led to changes in the regime of nutrients, the circulation of water on the surface of the soil or through the soil.

In order to ensure the protection and improvement of soil quality, through his production activity, man should favor the development of processes in the soil that lead to the concentration of nutrients and organic matter.

Thus, in order to prevent the physical degradation of the soil, it is necessary to reduce the soil preparation work to the minimum possible, to carry out agrotechnical work at the optimal soil moisture, to ensure an adequate structure of the crops depending on the configuration of the land and its slope, to introduce crop rotations with improving plants with

the role of restoring the soil structure and fixing atmospheric nitrogen (mixtures of legumes with perennial grasses).

1.5. Vegetation

From a phytogeographic point of view, the flora of the researched area is part of the Daco-Illyrian province, the district of Dealurilor Banatului and the Mures Corridor (BORZA 1943, BAŞCOIU 1965).

In this context, the importance of southern European woody species in building the vegetal carpet, representative of the researched area, should be highlighted, in which species such as*: Quercus petraea, Quercus cerris, Quercus frainetto, Quercus pubescens, Tillia tomentosa, Fraxinus excelsior, Fraxinus ornus , Prunus avium, Cornus mas* are associated forming biocenoses that house a remarkable number of thermophilic grass species (Coste, 2003).

In the wider valleys with groundwater closer to the surface and with lateral drains, isolated clumps of: *Salix alba, Salix fragilis, Populus alba and nigra, Alnus glutinosa, Rosa canina are found. Species such as: Robinia pseudacacia, Rosa canina, Prunus spinosa, Pyrus pyraster and, more rarely, Vitis silvestris* are found on the consolidated ravines and on the former detachment faces.

2. DISTRIBUTION OF SOILS ACCORDING TO NATURAL CONDITIONS OF FORMATION AND THEIR CHARACTERISTIC (table and figure 1).

Table 1.

Distribution of soils according to natural conditions of formation and their characteristic

No	Soil Territorial Unit (TEO)	Soil name	Surface (ha)
1.	002	Eutric regosol, medium weak skeletal clay/medium weak skeletal clay clay, developed on medium-sized non-carbonate slope materials	9,24
2.	004	Skeletal regosol, weak skeletal coarse sandy loam/hyperskeletal coarse sandy loam, developed on non-carbonate slope materials, coarse skeleton material	11,24
3.	014	Eutricambosol gleic-stagnic, moderately gleized, poorly stagnographed, medium clay/medium clay, developed on medium-sized non-carbonate eluvial materials	29,57
4.	020	Vertic preluvosol, deep stagnogleized, medium clay / medium clay clay weak skeletal, developed on medium-fine/medium non-carbonate slope materials, poorly eroded by water	4,14
5.	025	Preluvosol stagnic, poorly stagnogleized, weakly leached (endocalcaric), medium clay/clay clay, developed on carbonate slope materials, very fine, poorly eroded by wate	4,23
6.	028	Vertic-reddish preluvosol, weak stagnogleized, medium clay / medium clay clay, developed on non-carbonated, medium-fine in situ disaggregation-alteration materials	27,18
7.	032	Vertic-stagnic preluvosol, poorly stagnographed, medium clay / medium clay clay, developed on non-carbonated, very fine slope materials, poorly eroded by water	7,98
8.	039	Typical luvosol, deep stagnogleized, medium clay/medium clay clay, developed on non-carbonated, medium-fine slope materials, moderately eroded by water	32,47
9.	041	Typical luvosol, dusty clay/medium clay clay, developed on non-carbonated, medium-fine slope materials	21,34
10.	042	Typical luvosol, deep stagnogleized, dusty clay/medium clay, developed on non-carbonated, very fine in situ disaggregation-alteration materials	28,71
11.	043	Luvosiol stagnant, loosely stagnographed, medium clay/medium clay clay, developed on very fine/medium-fine non-carbonate slope materials	32,48
12.	047	Luvosol stagnant, moderately stagnographed, medium clay / medium clay clay, developed on non-carbonated, medium-fine slope materials	27,29
13.	048	Luvosiol stagnant, moderately stagnographed, medium clay / medium clay clay, developed on non-carbonated, medium-fine slope materials, moderately eroded by water	28,23
14.	056	Stagnic-vertic luvosol, weak stagnogleized, dusty clay/clay clay, developed on non-carbonated, very fine eluvial materials	10,43
15.	065	Typical stagnosol, very strong stagnogleized, weakly gleamed, medium clay / medium clay clay, developed on medium-sized non-carbonate colluvial materials	8,42
TOTAL			**282,95**

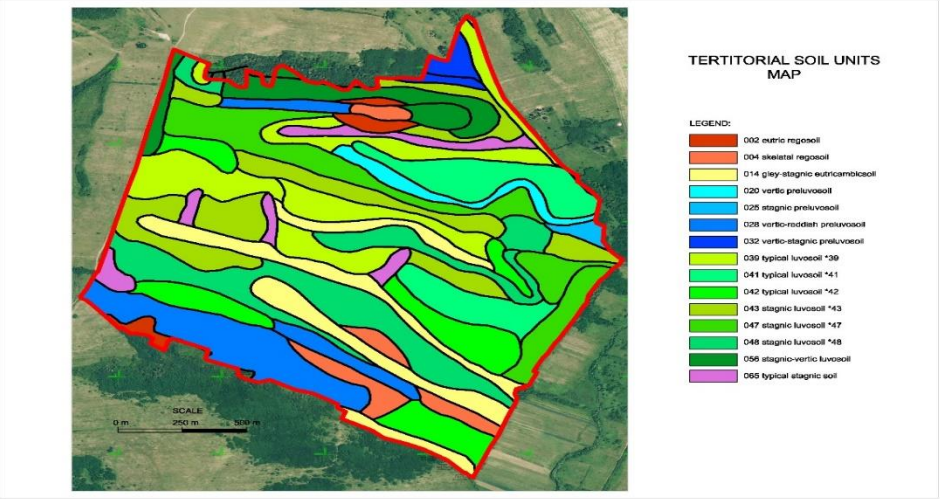

Figure 1. Soil Units

3. ASSESSMENT OF THE NATURAL PRODUCTION POTENTIAL OF AGRICULTURAL LAND FOR DIFFERENT CROPS AND CATEGORIES OF USE (table 2 and 4, and figure 2, 3 and 4).

Table no.2

BONUS NOTES for main agricultural crops and category of arable use

U.S.	Current use	Surface (ha)	GR	OR	PB	FS	CT	SZ	SO	MF	IU	IF	CN	LU	TR	LG	AR
2	Pasture	9,24	20	20	10	9	4	4	12	17	17	16	13	23	21	7	12
4	Pasture	11,24	3	3	1	1	1	0	1	1	2	2	1	4	3	1	1
14	Pasture	29,57	65	65	73	65	58	73	52	65	72	65	65	64	65	72	64
20	Pasture	4,14	22	19	11	8	3	3	10	16	17	12	13	26	18	6	12
25	Grassland	4,23	35	35	21	14	9	10	23	29	30	35	30	40	36	15	22
28	Arable	27,18	73	65	65	65	52	58	58	65	72	58	65	72	58	58	63
32	Arable	7,98	51	51	39	39	27	30	39	51	57	46	44	65	47	29	41
39	Arable	32,47	47	41	36	31	18	23	33	41	46	32	37	46	29	23	34
41	Arable	21,34	65	58	52	52	41	45	52	58	50	52	50	58	52	45	53
42	Arable	28,71	65	58	58	58	45	50	52	58	50	52	50	58	52	50	56
43	Arable	32,48	45	45	39	39	26	28	35	45	40	41	34	52	41	28	38
47	Arable	27,29	37	37	31	31	18	23	28	37	29	33	24	37	34	23	30
48	Pasture	28,23	47	47	37	37	22	28	37	47	47	47	37	52	43	24	38
56	Arable	10,43	73	65	65	65	58	65	58	65	72	65	65	72	58	58	64
65	Pasture	8,42	28	23	23	21	11	21	19	21	14	13	14	16	28	23	21

LEGEND

GR- wheat
OR- barley
PB-corn
FS-sunflower
CT-potato
SZ-sugar beet
SO-soybeans
MF-peas-beans
IU-flax oil
IF-flaxfiber
CN-hemp
LU-alfalfa
TR-clover
LG-vegetables
AR- arable

Table no.3

Classification in the favorability classes (fertility, quality) of the main agricultural crops and the category of arable use

TEO	Current use	Surface US (ha)	GR	OR	PB	FS	CT	SZ	SO	MF	IU	IF	CN	LU	TR	LG	AR
2	Pasture	9,24	V	V	V	V	V	V	V	V	V	V	V	IV	IV	V	*V*
4	Pasture	11,24	V	V	V	V	V	V	V	V	V	V	V	V	V	V	*V*
14	Pasture	29,57	II	II	II	II	III	II	III	II	II	II	II	II	II	II	*II*
20	Pasture	4,14	IV	V	V	V	V	V	V	V	V	V	V	IV	V	V	*V*
25	Grassland	4,23	IV	IV	IV	V	V	V	IV	IV	IV	IV	IV	IV	IV	V	*IV*
28	Arable	27,18	II	II	II	II	III	III	III	II	II	III	II	II	III	III	*II*
32	Arable	7,98	III	III	IV	IV	IV	IV	IV	III	III	III	III	II	III	IV	*III*
39	Arable	32,47	III	III	IV	IV	V	IV	IV	III	III	IV	IV	III	IV	IV	*IV*
41	Arable	21,34	II	III	III	III	III	III	III	III	III	III	III	III	III	III	*III*
42	Arable	28,71	II	III	III	III	III	III	III	III	III	III	III	III	III	III	*III*
43	Arable	32,48	III	III	IV	IV	IV	IV	IV	III	IV	III	IV	III	III	IV	*IV*
47	Arable	27,29	IV	IV	IV	IV	V	IV	IV	IV	IV	IV	IV	IV	IV	IV	*IV*
48	Pasture	28,23	III	III	IV	IV	IV	IV	IV	III	III	III	IV	III	III	IV	*IV*
56	Arable	10,43	II	II	II	II	III	II	III	II	II	II	II	II	III	III	*II*
65	Pasture	8,42	IV	IV	IV	IV	V	IV	V	IV	V	V	V	V	IV	V	*IV*

Classification of agricultural areas in quality (fertility) classes for the category of "arable" use, the situation is as follows: class V 24,62 ha (8,70%), class IV 133,12 ha (47,05%), class III 58,03 ha (20,51%) and class II 67,18 ha (23,74%).

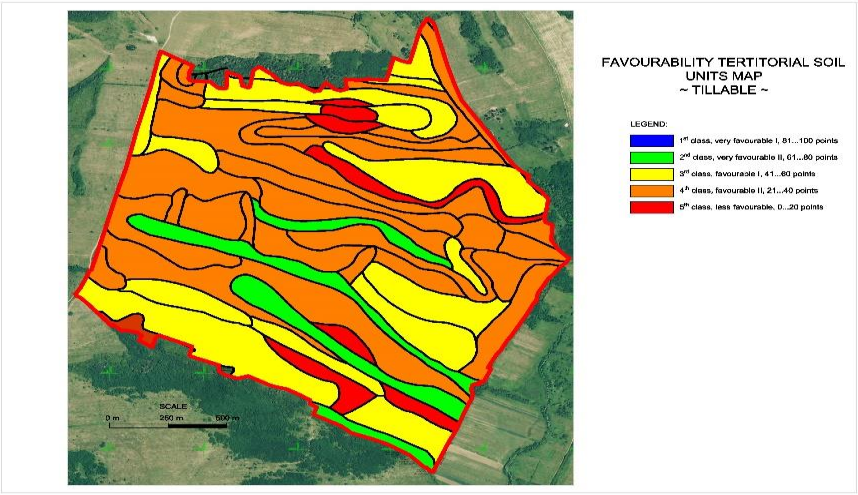

Figure 2. Favourability ”Tillable”

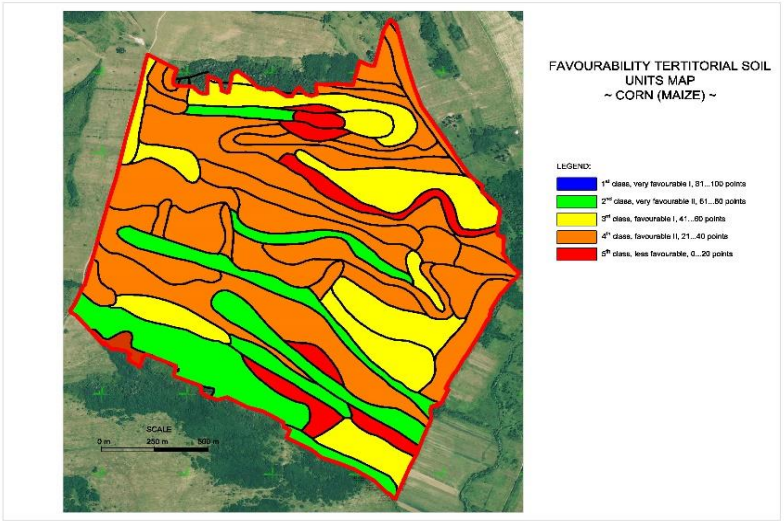

Figure 3. Favourability "Maize"

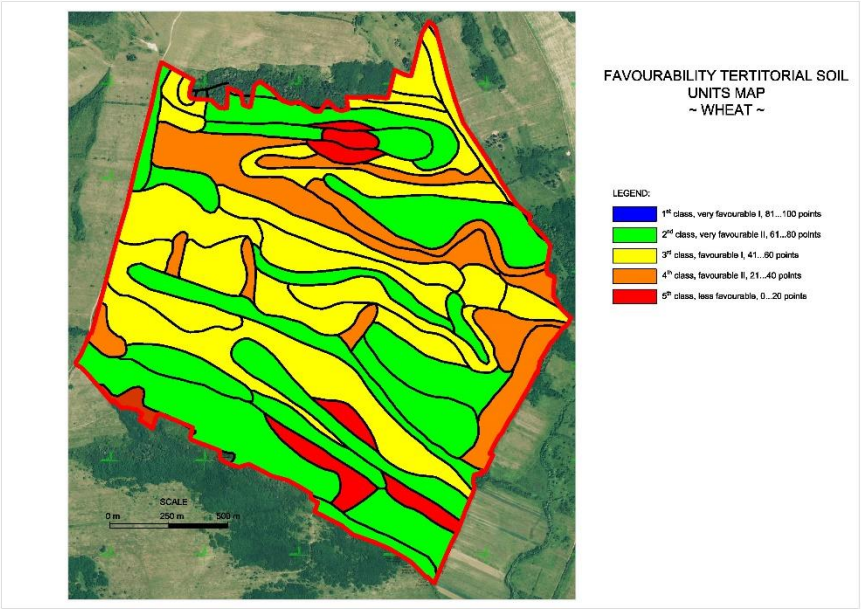

Figure 4. Favourability "Wheat"

CONCLUSIONS

The studied territory is located in the north-eastern part of Timis county, on E 70 and DJ 609B, DJ 609C at approx. 70 km from Timisoara, and approx. 25 km from Lugoj municipality, stretching over an area of approximately 282.95 ha of agricultural land.

1. From a geomorphological point of view, the studied perimeter is found in the piedmont complex Lipovei Hills which is part of the great morphostructural unit called the

Lower Mures Depression, space between the Highiş-Drocea-Zărand Mountains to the north, the Transylvanian Depression to the east, the Poiana Rusca Mountains to the south and the Pannonian Depression to the west.

2. The relief of the studied space is specific to the last three steps mentioned, characterized by long peaks that gradually descend from altitudes of 230 m in the north-east of the territory to altitudes of 160 m in the south-west of the territory, or even 120 m at the level of floodplains.

3. Lithologically, the studied space is characterized by a succession of layers of age, thickness and granulometric composition different depending on the forms of meso and microrelief, consisting predominantly of sandy-clayey quaternary fluvio-lacustrine deposits, with intercalations of formations belonging to the Pliocene, these are supported either by Miocene or Mesozoic formations, or by older, Palaeozoic formations.

4. Hydrologically, the researched area is part of the group of south-western hydrological systems, the Timiş – Bega hydrographic basin.

5. The average multiannual temperature at Lugoj station registers values of 10.7oC, and the average multiannual value of precipitation is 725.9 mm.

6. From a phytogeographical point of view, the flora of the researched area is part of the Daco-Illyrian province, Banat Hills district and Mures Corridor (Borza 1943, Başcoiu 1965), woody species representative for the researched space*: Quercus cerris (sky), Q. frainetto (barberry), Q. pubescens* (fluffy oak), *Tillia tomentosa* (linden), *Fraxinus ornus* (mojdrean), *Cornus mas* (horn), are associated forming biocenoses that shelter a remarkable number of thermophilic grassy species.

7. Based on data collected from the field and existing studies, processed and interpreted, the studied agricultural land consists of the following categories of use: arable 187,88 ha (66,40 %), pastures and meadows 95,07 ha (33,60 %). Total 282,95 ha:The average multiannual temperature at Lugoj station registers values of 10.7oC, and the average multiannual value of precipitation is 725.9 mm.

8. classification of agricultural areas in quality (fertility) classes for the category of use "arable", the situation is as follows: class V 24,62 ha (8,70%), class IV 133,12 ha (47,05%), class III 58,03 ha (20,51%) and class II 67,18 ha (23,74%).

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