

SOIL RESEARCH IN VIEW TO EXTEND AGRICULTURAL LANDS IRRIGATION IN CENTRAL BARAGAN PLAIN

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Abstract

Climate data have been gradually changing due to progressive atmospheric warming resulting from the combined action of more factors natural and human, which determines both a reduction in precipitation amount at soil level and an increase in temperature. Extreme climate aspects are amplified by the current status of irrigation systems requiring both new technologies and the extension of tracts that can be irrigated, which is an instrumental measure to enhance physical and chemical features of soil units in Romanian dry-subhumid regions, covered to a large extent by Baragan Plain.

Agricultural potential increase in Baragan Plain focuses especially on irrigation extension, taking into account restraints related to wind erosion, surface erosion, salinization/acidification, soil texture etc., which may result in biodiversity enrichment both in agro-ecosystems and in ecosystems, provided its known dwindling trend in dry-subhumid areas, and at the same time it calls for the implementation of a sustainable management of soil resources in this area.

INTRODUCTION

According with the geographical position, Romania presents a pronounced variability concerning the distribution of precipitation quantities during a year, especially on summer. From the weather data between 1881-2000 in our country were registered four important dry periods (1894-1905; 1918-1920; 1942-1953; 1982-2000, the highest point being the drought from 2007 considered by the specialists the severe one from the last 60 years), but the duration of those drought periods were initially by 11-13 years, and lately by 20 years. The manifestation of severe drought phenomena affected many areas, the most important being in the South and East-Southern of Romanian Plain, respectively Oltenia and Bărăgan Plain, important agricultural areas of Romania.

The agriculture is a directly depending activity sector on water distribution in soil by crops establishment and de growth of agricultural plants. The development of the irrigation systems already existing or creating new ones have to consider also the local conditions regarding relief, morphological, physical and chemical

characteristics of soil and crop type, these representing the base requirements to create a new sustainable agricultural management system.

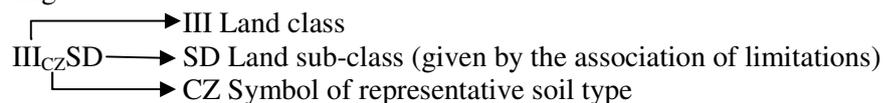
MATERIAL AND METHODS

This study presents the soil pretability at irrigation from some parameters point of view (water erosion, wind erosion, alkalisation, salinization, gleization, stagnogleization, texture, skeleton, edafic volume etc) which have a high influence on soil resource behavior at irrigation.

Using the Methodology of elaboration pedological studies (ICPA 1987) was achieved the classification of agricultural lands by pretability to irrigation fitting out.

It was established the basic taxonomic unit -class- function with the pretability to irrigation fitting out, and with geographic information system (GIS) was achieved the irrigation pretability map of the land from Central Bărăgan Plain.

The formula structure for the general pedological studies (little and middle scale) is the following:



Limitations and restrictions:

- S Limitations because of soil salinity
 - S salinization and/or alkalinisation
- Y Limitations because of other soil chemical characteristics
 - A acidity
- X Limitations because of some soil physical characteristics
 - N rough texture and wind erosion
 - C fine texture
 - O low carrying capacity
 - V low edafic volume
- J Limitations because of lands coverage or non-uniformity
 - Z land coverage with rocks and stones
 - U land non-uniformity
- D Limitations because of humidity excess
 - Q freatic humidity excess
 - W stagnant humidity excess
 - H outflow flooding
- I Limitations because of erosion or sliding
 - E land slope, erosion risk and surface erosion
 - R depth erosion and F slidings or collapse

RESULTS AND DISCUSSION

Ameliorative land classes represent the highest classification level considering the biggest intensity of the restrictive factors or degradation risks (table 1, figure 1).

Table 1

Restrictive factors or degradation risks which affect the soil pretability

Code	Characteristics	Surface (ha)	Share (%)
	No restriction	102882.46	26
E	Land slope, erosion risk and surface erosion	53501.02	14
Q	Freatic humidity excess	108863.56	27
S	Salinization and/or alkalisation	7863.38	2
W	Stagnant humidity excess	15557.51	4
C	Fine texture	98553.56	25
N	Rough texture and wind erosion	8905.19	2

It was established 5 classes of lands with different pretability at irrigation (table 2, figure 2).

Table 2

Lands agricultural classes with their pretability

No.	Class	Surface (ha)	Share (%)
1	Class I	102882.47	27.2
2	Class II	125341.91	32.7
3	Class III	126805.00	34.1
4	Class IV	18806.14	5.2
5	Class V	1340.05	0.8

First class, these are very good lands for irrigation fitting out, practically without degradation risks or agricultural use limitations (as arable); irrigable without restrictions. This class includes plane, horizontal or very weak inclined lands (slope under 2%), with deep soils having moderate or fine moderate texture, relative uniform on profile, with favorable permeability; natural drainage is good, and the hydrostatic level of groundwater is situated at depth higher than 5-6 m. Do not present erosion problems, humidity excess, salinization and/or alkalisation, flooding etc. These lands are distributed especially in the East half from Central Bărăgan Plain (Strachinei Plain) and in the first third from Ialomiței meadow, but

disseminated can be observed also in the centre of Pogoanele field and in the North part of Urziceni field. These are having a high density in the spatial distribution of the irrigable lands, being soils like Haplic Fluvisols (FLha), Eutric Fluvisols (FLeu), Calcaro-calcic Kastanozems (KCcc-ca), Calcic Chernozems (CHca) and Haplic Chernozems (CHha).

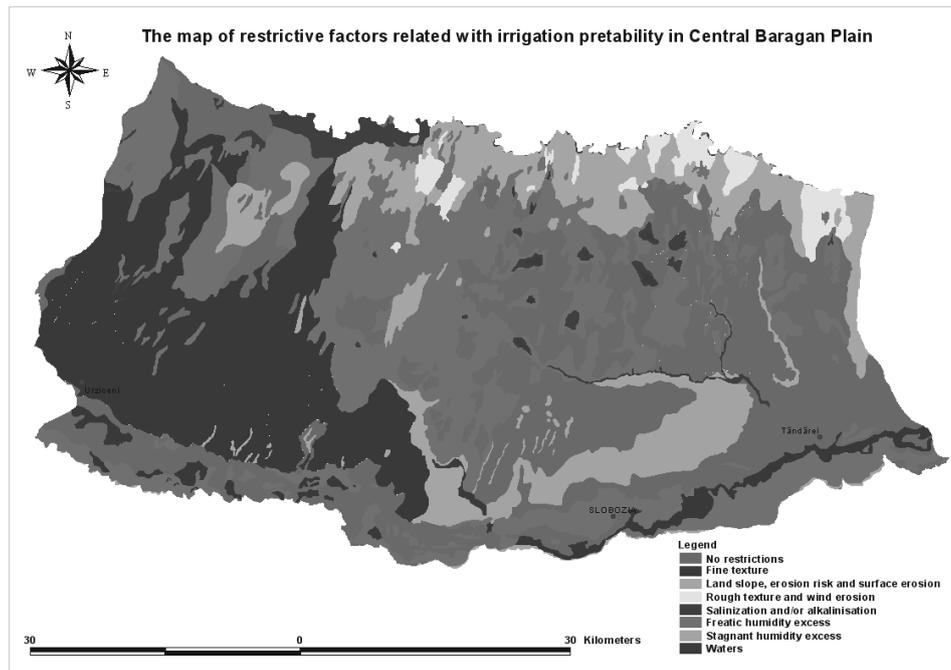


Fig. 1. The map of restrictive factors

Second class, there are good lands for irrigation fitting out, with degradation conditions and/or low agricultural use limitations determined by one or more soil factors, rock, salinization, alkalinisation, relief, erosion, drainage, floodability; irrigable with low restrictions or some prevention works requirements. These lands do not put difficult fitting out problems and require low investments. There are distributed all along Central Bărăgan, but more in the central area, in the South part of Amara field and in the North of Mohreanu field. There are represented by few types of soils: Calcic Chernozems (CHca) and Haplic Chernozems (CHha).

Third class, there are moderate good lands for irrigation fitting out, with degradation risk and/or moderate agricultural use limitations because of one or more soil factors forementioned, irrigable with moderate restrictions or some prevention and improvement works requirements. These lands require relative difficult fitting out and exploitation problems and need considerable investments. The soils from these lands are represented by Haplic Fluvisols (FLha), Eutric

Fluvisols (FLeu), Calcic Chernozems (CHca), Haplic Chernozems (CHha), Eutric Arenosols (AREu) and Haplic Solonetz (SNha). The high area of these lands is situated in Padinei Plain, and occupies almost exclusive the South of Amara and Tătaru fields.

Fourth class, there are low favourable lands (marginal) for irrigation fitting out (irrigable in special conditions), with degradation risk or severe agricultural use limitations (as arable), irrigable with severe restrictions or some intensive improvement and prevention works requirements. These lands are not indicated for irrigation, excepting for some special crops (rice, legume, fruit trees, meadows etc.) or in some special fitting out conditions. Usually, there are necessary high investments and the fitting out requires difficult problems. It is characteristic especially for the half North of the Central Bărăgan Plain, with a high incidence in the east part of the Călmățui meadow and in the Ialomiței meadow, south of Țândărei. Also, important areas occupied with these lands can be found around the lakes from the central and East part of Bărăgan. From the pedo-landscape point of view, these lands are represented by Haplic Chernozems (CHha), Gleyic Chernozems (CHgl), Eutric Gleysols (GLEu), Eutric Arenosols (AREu), Haplic Solonetz (SNha) and Haplic Solonchaks (SCha).

Fifth class, there are very low favorable lands for irrigation fitting out degraded or with very severe agricultural use limitations because of salinization and/or alkalinisation and drainage, non-arable in present, but after the fitting out and/or preliminary improvement could become arable. There are necessary high investments for fitting out and improvement and special technical and material efforts; sometimes necessitate supplementary studies and experiments to solve the improvement problems. There are especially along the river Valea Lată Sarata and in the Ialomita meadow. A narrow strip is presented in the East part of the Tataru field. These lands are represented by soils like: Calcaric Regosols (RGca) și Eutric Gleysols (GLEu).

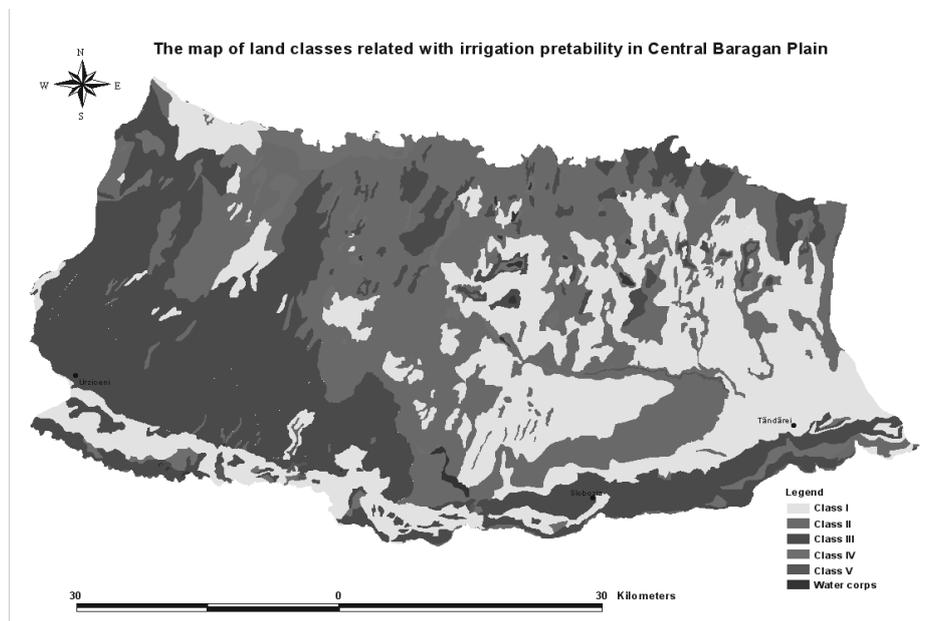


Fig. 2. The map of land classes related with irrigation pretability

CONCLUSIONS

1. It can be appreciated that the Central Baragan Plain are in urgent need of being prepared for irrigation, because are very arid and agricultural production is very powerfully affected by long periods of drought.
2. From the irrigation possibility point of view, this plain has a big land surface that can be exploited, especially if we think that the spatial representation of pretability classes I and II is very large, but all of these can be made valuables only by the research of different methods and specific irrigating directions, adapted to area's characteristics (climate, hydrography) and strictly connected with her territorial resources.
3. The soil types calcic chernozem and cambic chernozem represent approximately 80% from the pedological resources that constitute an important special element considering the soil quality in water deficit problems.
4. The introduction of irrigation in the affected area will make the land degradation trend to decrease because of existing water.

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