

## GENERAL ASPECTS CONCERNING THE CLIMATE OF THE OLTENIA REGION. CASE STUDY: THE OLT COUNTY

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### Abstract

*The analysis and interpretation of data on the agro-climatic resources of a cultivated area offer the possibility to characterize the degree of favorability for cultivated species depending on the climate and soil bid. Depending on the climate, soil and the agricultural species requirements, the agro-technical management system must be applied properly, so as to allow the improvement of agricultural productivity. The aim of this study is to assess the agro-climatic resources of the Oltenia region, for the period 1961–2008 and especially of the Olt County, in terms of thermic and precipitation resources for the period 1990–2013. The knowing of these conditions is required for choosing the cultivated product and the crop production interventions used for obtaining optimal economic crops.*

**Key words:** air temperature, precipitation, Oltenia, the Olt County

### INTRODUCTION

The climatic events of the last decades have drawn the attention of the experts upon a global climate warming trend.

The increase in intensity and frequency of the climatic extremes have produced damage in all the economic sectors, especially in the agricultural sector, which is closely related to the weather evolution. The impact of climate variability on the agricultural crops is quantified by the potential of the meteorological-related parameters, which provide favorable and/or unfavorable conditions, depending on the intensity, duration and way of the disturbances, and on the temporal variation and vulnerability of the plant species. The agricultural productions will be affected by this climatic variability, especially in the agricultural areas with high risk of drought and low potential for adaptation (Sandu I. et al, 2010). [11]

Based on the climatic studies, one can find out the characteristics of a natural region, thus ensuring an efficient use of the agro-climatic

potential of the region (Lungu M., 2013). [9]

This article will analyze the main meteorological elements: the air temperature and precipitations, thus highlighting the potential peculiarities of the thermic and hydric resources (Dumitrașcu M., 2006). [7]

The vital activity of the plants depends on the thermic conditions and precipitations (Săndoiu I., 2001) [12].

The agro-climatic analysis is made for the Olt County, in the period 1990–2013. It is also provided a short analysis of the agro-climatic potential of the historical region of Oltenia, for the period 1961–2000, which the Olt County is part of.

### MATERIALS AND METHODS

In developing these analyzes, there have been used agro-climatic data from representative agro-climatic stations for the Oltenia region, but especially the data from the Slatina and Caracal stations. The agro-climatic information processed by CMR Oltenia are also added. The processing of the statistical

data aimed to analyze the thermic regimes, the annual precipitations and to calculate the De Martonne aridity index. Furthermore, graphics and maps are added to these statistical methods.

## RESULTS AND DISCUSSIONS

**Oltenia** is the historical region in the south-western Romania, between the Olt river in the east, the Danube river in the south and west, and the Carpathians in the north (Figure 1). From the north to the south, it covers about  $1^{\circ} 55'$  latitude, and from west to east at  $2^{\circ} 53'$  longitude, with an area of 29015 km<sup>2</sup>, representing 12.2 % of the country surface (Marinică I., 2006). [10]

In terms of altitude, the relief descends from the north, from 2519 m – the Parângul Mare Peak, to the south, where the elevation is below 100 m, in the Danube Valley. The north of Oltenia is mountainous, being represented by the Retezat–Godeanu and the Parâng Mountains. At the foot of the Carpathians, there are the Oltenia Sub-Carpathians, the Mehedinți Plateau and the Severin Basin, continued by the Getic Piedmont (Plateau) and the Oltenia Plain, subunit of the Romanian Plain.

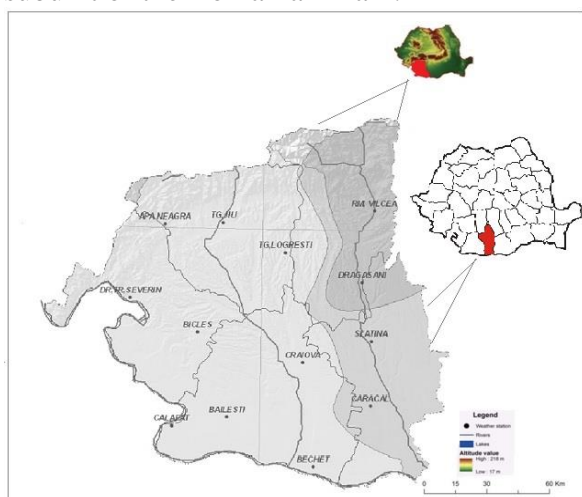


Fig. 1. The geographical position of the Oltenia region and of the Olt County in Romania  
Source: own processing from [www.google.ro](http://www.google.ro)

From the administrative point of view, the Oltenia region includes the counties of Mehedinți, Gorj, Vâlcea, Dolj and Olt, plus small areas of the Caraș-Severin and Hunedoara counties.

**The Olt County** is located in the southern part of Romania, along the lower course of the Olt river, from where it takes the name, representing 19 % of the Oltenia region (Coteț P. et al., 1975). [6]

The relief of the Olt County overlaps the major units: the Getic Piedmont (Plateau) (33 %) in the north and the Romanian Plain (67 %) in the south (Iagăru et al., 2001). [8]

From the altitudinal point of view, the county is situated between 400 m in the north and 20 m in the south, in the Danube Valley.

The joint action of the radiative, dynamic, physical and geographical factors has generated climatic conditions which clearly identify Oltenia in Romania and of the Olt County in Oltenia.

Oltenia and thus, the Olt County belong to the temperate climate of transition, to the subsector with a transition climate from outside the Carpathian arch (Ciulache, 2002). [3]

In Oltenia, the meteorological station with the highest altitude, of 1548 m, is the Parâng station, while the lowest is Bechet, at 35.9 m. The most northern stations are Voineasa and Petroșani, the most western is Băile Herculane, while the most eastern stations are Caracal and Slatina (Fig.2).



Fig. 2. The geographical position of the Slatina and Caracal meteorological stations in Oltenia  
Source: own processing from [www.arcgis.com](http://www.arcgis.com)

Oltenia, by its position in the country, is under the influence of the baric centers of action in the Mediterranean Sea, the Atlantic Ocean, the East-European Plain, the North Africa, the

Scandinavia Peninsula and even Greenland. Above Oltenia prevails, in descending order of frequency, the following air circulation types: southern, western and eastern (National Administration of Meteorology, ANM, 2008).

[1]

**The thermic regime of Oltenia** is characterized by an annual average temperature of 10.6 °C for the period 1961–2000 and 11.4 °C, for 2001–2008, being recorded a positive deviation of +0.8 °C. The position of the Carpathians and Sub-Carpathians is reflected in the direction of air masses penetration in Oltenia, so that the distribution of the annual average temperatures decrease from the west to the east and from the north to the south, being recorded 11.7 °C at Drobeta Turnu Severin, 10.9 °C at Craiova and 10.4 °C at Drăgășani. The highest average temperature values are recorded in the southern Oltenia, where there are the lowest altitudes. The 11 °C annual isotherm passes the north of Drobeta Turnu Severin, the south of Segarcea and in the east of this village is almost parallel to the isoline of 100 m altitude. In the period 1961–2008, the year 2007 was the warmest, the annual average temperature being 12.6 °C. The summer of 2007 was comparable to that of 1946, but with a higher persistence of the hot days ( $t_{max} \geq 35.0$  °C), so that it exceeded the absolute maximum temperature of July, by country, by 0.8 °C above the absolute maximum in 2000, being 44.3 °C at Calafat, on the 24th of July 2007 (Sandu et al., 2010).

[11]

Since 1961, there has been an increasing emphasis in the annual average temperatures across the whole country (Busuioc A. et al., 2003). [2]

**The precipitation regime of Oltenia** is characterized by an annual precipitations of 650.3 mm for the period 1961–2000 and of 709.5 mm for the period 2001–2008, registering a positive deviation of 59.2 mm. The first period is considered optimal, while the second one is a rainy period from climatological point of view (Sandu et al, 2010). [11]

In Oltenia, there are recorded two maximum of precipitations, the first in November–

December and the second in May– June. In the western part of Oltenia, the second maximum is close to the first one, while in the eastern part of the region it disappears. The cause is the atmospheric circulation with an eastern part, which brings cooler air masses and poorer precipitations than in the western half. For the period 1961–2000, the year 2005 was an excessively rainy year, being considered exceptionally, by scale, exceeding the years 1970, 1972, 1975 and 1991.

Due to its position, the eastern part of Oltenia, of the Olt County, is characterized by large thermic amplitudes caused by the continental air masses coming from the east and northeast, accompanied by storms in the winter and by intensive heating in the summer, determined by the continental tropical air masses coming from the south. As about precipitations, the Olt County records a disruption in the normal course of the annual quantities because of the emergence of a central portion, focused on the Olt River, at the confluence of the Olt river with the Olteț river, with precipitations below 500 mm (Coteț et al., 1975). [6]

In the last decades, this area has expanded to the west and north of the County, because of the deforestation along with the Olt Valley, of the hydro-electric dams and of the emergence of some turbulent air currents (Iagăru et al, 2001). [8]

**The thermic regime of the Olt County** is characterized by an annual average temperature of 11.4 °C at Slatina and 11.6 °C at Caracal, for the period 1990–2013.

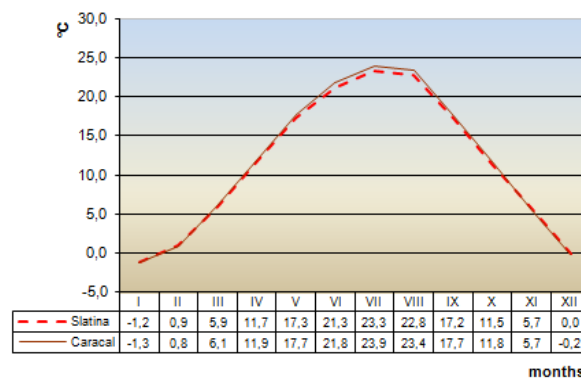


Fig. 3. The annual regime of air temperature at the Slatina and Caracal stations, 1990–2013

Source: data processed after ANM

The Olt County is located between the annual isotherm of 11°C located almost parallel to the Danube and the one of 10 °C, situated at the north of the border with the neighboring counties of Vâlcea and Argeş.

During the year, except November, when the same temperature of 11.4 °C is registered, and February, when a higher temperature by 0.1 °C is registered for the Slatina meteorological station, all the other months present higher monthly average values by 0.1 °C to 0.6 °C, at the Caracal meteorological station (Fig. 3).

This is the consequence of the geographical position further inside of Caracal, in comparison to Slatina, which is located near the Olt Valley. The highest differences are from June to September.

**The precipitation regime of the Olt County**, like the thermic one, has the same continental influence, which is primarily in the form of rainfall, irregularly distributed across the county. The precipitations have a frontal and thermo-convective origin and sum up 589.4 mm at Slatina and 527.3 mm at Caracal, for the period 1990–2013. Generally, the precipitations are not sufficient for the autumn and spring crops, which thus require irrigations. The analysis of the monthly precipitations shows the increase in quantity from February to July and then a decrease until January, at both the meteorological stations (Fig. 4).

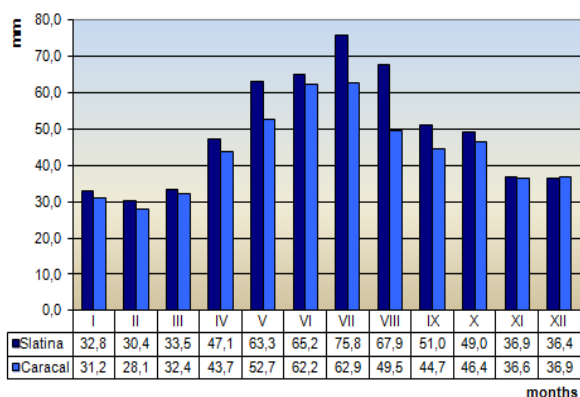


Fig. 4. The annual precipitations regime of the monthly average precipitations at the Slatina and Caracal stations, 1990–2013

Source: data processed after ANM

Most precipitations, 60–70%, fall in the warm half of the year (April to September), overlapping the vegetation period.

**The De Martonne aridity index** indicates the moisture or drought conditions for an area. The index has been calculated annually, based on the formula  $I_a = P/(T+10)$ , where P is the annual average amount of precipitation, T is the annual average temperature and 10 is the Celsius degrees value which is added to the denominator in order to produce positive results (Constantin et al., 2014). [5]

For the period 1990–2013, in the Olt County, the aridity index varies from 24.4 at Caracal to 27.5 at Slatina. According to the classification of this index, the Olt County belongs to the semi-humid climate, where the silvosteppe vegetation grows.

## CONCLUSIONS

The air temperature, along with the precipitations influence the processes of growth, development, photosynthesis, respiration and transpiration of plants. These processes occur at a specific temperature and precipitation amount specific to each species and to each vegetable crop (Cofas El. et al., 2014). [4]

Based on the analysis, it can be concluded that the Olt County indicates an emphasis of the continental character from the north to the south, with specific regional influences of the Danube and the Olt Valley. The analysis of the agro-climatic data (air temperature and precipitations) in the Oltenia region shows a variability from year to year, comparing to the optimal limits of each agricultural period, each growing season and crop year. To know these conditions is essential in order to choose the type of cultivated plants and for the crop production interventions which ensure, from economic point of view, optimal crops.

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