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CONSIDERATIONS UPON THE CLIMATIC CHARACTERISTICS OF THE AGRICULTURAL YEAR 2011 – 2012 IN THE OLT COUNTY

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Abstract

The agricultural production in a region is influenced by the natural factors, the climatic and social ones and especially by the technological level and the value of investments. The analysis of the relationship between the climatic factors and the agricultural production is important in the agricultural management. The primary objective of this study is to analyze the main climatic factors: air temperature, soil temperature, precipitations and relative air humidity which condition the performance of the fundamental processes that occur in plants. The analysis of these factors is performed for the agricultural year 2011 – 2012, considered a dry year in the Olt County.

Key words**:** *air temperature, agricultural year, precipitations, soil temperature, the Olt county*

INTRODUCTION

All the climatic conditions during an agricultural year determine the value of the crops through the evolution of each climatic parameter, in closer or farther limits, being connected with the bioclimatic requirements, specific to each phenological stage of an agricultural culture.
The climatic conditions are not the same for all the crops and geographic regions in which the plants are grown.
Therefore, the weather may be favorable or restrictive to cultures, as increasingly deviate from the optimal necessary, becoming risk factors with different degrees of intensity [6].
This study will analyze the main climatic factors which limit the vegetative development processes and the productivity of the crops [3]. They are: the air temperature, soil temperature, precipitations and the relative air humidity.
The climatic analysis will be made for the agricultural year 2011 – 2012, which corresponds to the period September 2011 - August 2012 in the Olt county.

The Olt County (Figure 1) is a region characterized by a relief of smooth plains and low plateaus, mainly covered by chernozem soils or brown and reddish brown forest soils [4]. The general inclination of the relief is from the north to the south, offering large areas with a sunny exhibition [5].

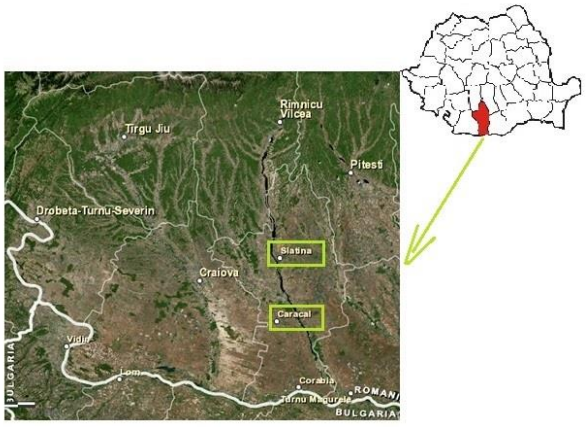

Fig. 1. The geographical localization of the Olt county and of Slatina and Caracal meteorological stations
Source: Own processing from www.arcgis.com

From climatic point of view, the Olt county belongs to the transitional temperate climate, the subsector with a transition climate from outside the Carpathian arch [1].

In relation to these conditions, with the traditions and other factors, the Olt county imposes as an important agricultural region of the country, especially for cereals. The agricultural area in the Olt county, in 2008, was 437165 ha, distributed as follows: 390569 hectares of arable land, 31022 hectares of natural grassland, 7630 hectares of vineyards and orchards 7307 [11].

MATERIALS AND METHODS

In order to analyze the climatic agricultural year 2011 – 2012, there were used the statistical-climatic data from Caracal and Slatina meteorological stations (Figure 1). Caracal meteorological station is located at 44° 07` north latitude, 24° 21` east longitude and at 112 m altitude, while Slatina meteorological station is located at 44° 27` north latitude, 24° 22` east longitude and at 165 m altitude.
To these are added the agro-climatical briefings drafted by NMA [10], the statistical methods, graphs and maps.
The processing, representing and interpreting of the statistical data aim the brief analysis of the climatic conditions of the Olt county, for the period September 2011 – August 2012.

RESULTS AND DISCUSSIONS

The main climatic factors with an important role in the growth, development and productivity of the crop plants are: the air temperature, soil temperature, precipitations and the air humidity, plus the light.
The air temperature affects the physiological processes of plants (photosynthesis, respiration, water absorption etc.). Each physiological process occurs at air temperatures ranging between a minimum and a maximum, between which is an optimum for the process [9].
These values are specific for each species cultivated, growth stage and desired level of the crop, thus delimiting the range area of each species grown [7].
For the agricultural year 2011 – 2012, in the Olt county, there was an annual average temperature of 11.7 ^{0}C at Slatina and 12.2 ^{0}C at Caracal, being by 0.3 ^{0}C and respectively 0.6 ^{0}C higher than the annual average during 1990 – 2013.
The high temperatures in July and August, are not used by plants, influencing in a negative way the vegetation by the phenomena of heat and drought that occurred in the agricultural year 2011 – 2012 (Figure 2).

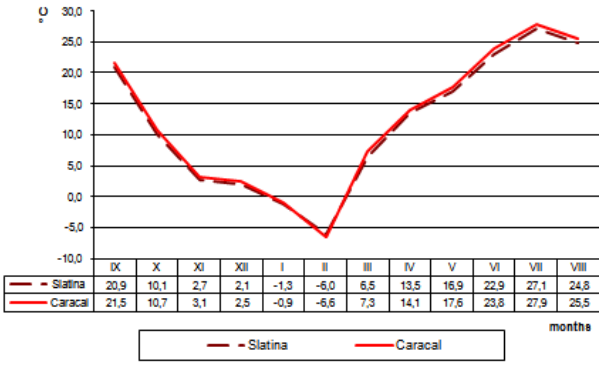

Fig. 2. The annual air temperature regime (℃) at Slatina and Caracal meteorological stations in the agricultural year 2011 – 2012
Source: Processed data after ANM

In terms of the monthly minimum temperature, the lowest minimum was recorded at Slatina, in February, of -23.9 ^{0}C, and in January, at Caracal, of -23.3 ^{0}C (Table no. 1). The maximum temperature recorded the highest monthly value of 39.6 ^{0}C in August, at Slatina and 40.7 ^{0}C in July, at Caracal, being the highest in the period 1990 – 2013 (Table 1).

Table 1. The minimum and maximum monthly air temperature (℃) at Slatina and Caracal meteorological stations in the agricultural year 2011 – 2012

Month/ Meteoro-logical station	Slatina		Caracal	
	Minimum temperature	Maximum temperature	Minimum temperature	Maximum temperature
IX	8.1	34.9	10.3	35.3
X	- 2.4	27.8	- 2.2	28.1
XI	- 7.0	15.9	- 5.9	16.5
XII	- 6.8	14.7	- 5.6	17.9
I	- 20.3	11.9	- 23.3	12.7
II	- 23.9	10.4	- 23.2	7.2
III	- 6.9	24.0	- 4.6	25.3
IV	- 2.0	28.7	- 1.7	28.8
V	8.4	30.5	8.8	30.7
VI	9.9	35.4	10.6	36.8
VII	14.1	39.0	15.3	40.7
VIII	10.6	39.6	12.8	40.5

Source: Processed data after ANM

Each phase of vegetation occurs with the accumulation of a certain sum of effective temperatures, causing the development effectiveness.

The annual sum of the daily average temperatures ≥ 5 ^{0}C increases from north to south, from 3800 ^{0}C to 4000 ^{0}C. The sum of average daily temperatures ≥ 10 ^{0}C ranges between 3400 ^{0}C and 3800 ^{0}C and that ≥ 15 ^{0}C ranges from 2800 ^{0}C to 3200 ^{0}C. The actual average daily temperatures sum required for each phenological phase reflects, quantitatively, the requirements of plants against temperature.

In the agricultural year 2011 – 2012, the number of tropical days (≥ 30 ^{0}C), in the Olt county ranged from 80 days at Slatina (2.2% of the agricultural year) and 91 days at Caracal (2.5% of the agricultural year).

The soil temperature is closely related to the air temperature, their effects on plants being simultaneous.

In the crop year 2011 – 2012, in the Olt county, the annual average was 13.7 ^{0}C at Slatina and 12.4 ^{0}C at Caracal, the monthly evolution being shown in Figure 3.

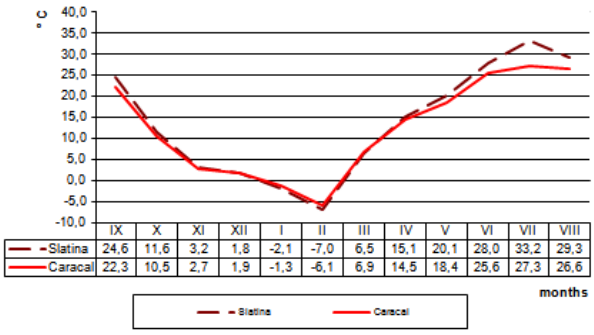

Fig. 3. The annual soil temperature regime (℃) at Slatina and Caracal meteorological stations in the agricultural year 2011 – 2012
Source: Processed data after ANM

Precipitations are a natural source of supplying the soil with water. The water requirement for the plants differs from one phenological stage to another. When precipitations coincide with the critical water stages for plants, their effectiveness in achieving the harvest is great. For the agricultural year 2011 – 2012, in the Olt county, there were recorded values of 459.4 mm at Slatina and of 340.5 mm at Caracal. These values were less than the multiannual period 1990 – 2013, with 130 mm at Slatina and 186.8 mm at Caracal. During the year, the values ranged between 0.0 mm in September and November 2011, for both stations and 69.8 mm at Slatina and 81.7 mm at Caracal, both values recorded in January 2012 (Figure 4).

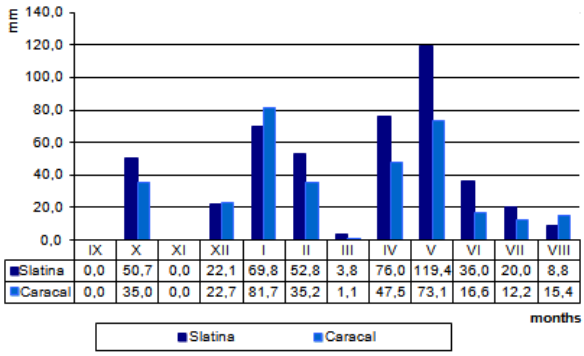

Fig. 4. The annual precipitations regime (mm) at Slatina and Caracal meteorological stations in the agricultural year 2011 – 2012
Source: Processed data after ANM

During the agricultural year 2011 – 2012, September, November 2011 and March 2012 were the driest months of the period 1961 – 2014 [8]. Throughout the year, there was a total of eight months of drought.

The lack of precipitations and soil water causes the drought, determining an imbalance between requirements of plants and their ability to supply with water [2].

The relative air humidity directly influences the vital processes of the crop plants. If the air humidity is low, it intensifies the plant transpiration and their water consumption increases, and if it is high, it prevents perspiration, pollination, flowering and fructification. In the analyzed annual year, the annual values were 70.7% at Slatina and 68.9% at Caracal, values below the multiannual average of the period 1990 – 2013 (Table 2).

Values of ≤ 50% relative humidity in July and August, for the both meteorological stations represent a huge shortage of humidity in the air (Table 2).

Table 2. The relative air humidity (%),at Slatina and Caracal meteorological stations in the agricultural year 2011 – 2012

Month/ meteorological station	Slatina	Caracal
IX	57	57
X	71	74
XI	81	82
XII	92	89
I	93	84
II	90	86
III	60	62
IV	65	65
V	77	73
VI	64	60
VII	49	47
VIII	49	48
an	70.7	68.9

Source: Data processed after ANM

CONCLUSIONS

The agricultural year 2011 – 2012, which corresponds to the period September 2011 – August 2012, was characterized, for the Olt county area, through a higher thermal air regime than normal. Associating with the air and soil humidity deficit, the vegetation deterioration could be noticed for the autumn crops. The long precipitations deficit and the high water need of plants, especially during May-June for the autumn crops, and from June to August for the spring crops, maintained and expanded the soil droughts.

In these climatic conditions, which characterized the agricultural year 2011 – 2012 as a dry one, for the row crops, there were reported forcing stages, fading, twisting and partial or total drying of leaves, increasing the percentage of seeds for the dry sunflower and a large number of sterile plants.

Taking into account the above analyzed climatic conditions, there were recorded the following productions in the agricultural year 2011 – 2012, in the Olt county: 286894 tonnes of wheat, with 185839 tons less than in the agricultural year 2010 – 2011, 24956 tonnes of barley, 136338 tonnes of maize, with 325 554 tonnes less than in the previous agricultural year, 79380 tons of sunflower and 174953 tonnes of vegetables, 23185 tons less than in agricultural year 2010 – 2011 [12].

Agriculture represents the economic sector with the highest vulnerability to the climate variability as a result of the reliance on weather developments during the growing season of the crops.

To know the climatic conditions is absolutely necessary in order to take the necessary measures for reducing the impact on the agricultural production process.

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