

DROUGHT AND CANICULA IN THE AGRICULTURAL YEAR 2011-2012 IN THE SOUTH-WEST OF ROMANIA

I. MARINICĂ¹, ANDREEA FLORIANA MARINICĂ²

Abstract. - Drought and Canicula in the Agricultural Year 2011-2012 in the South-West of Romania. The atypical weather during 2011 has also continued in 2012 (Marinică 2006, Bogdan, Marinică 2007, Marinică & all, 2011). Consequently, the winter of 2011, in Oltenia had two distinct parts: a first warmish and droughty part, and a second cold part, marked by drought too. In November, the weather was colder than usual. This was the first excessively droughty autumn of the last 13 autumns in Oltenia. During the winter of 2011-2012, although most of it was warm, there were registered 20 days of excessive frost and abundant snowfalls (25 January 2012-15 February 2012). In April 2012 the drought continued. The excessively warmish weather returned in summer, associated with an intense drought. On the whole the agricultural year 2011-2012 was an excessively droughty year (ED), and the excessive drought was mainly registered in two essential periods: in autumn and during the whole summer, namely in the periods in which there is a maximum need of water. The paper analyses in detail the characteristics of this agricultural year and the consequences on crops.

Key words: *drought, canicular heat, frost, thermal and hydric stress.*

1. Introduction

In this time interval, the crops bears significant thermal variations from the cold and frost of winter to the heat, canicular heat and sun glow of summer. Hydrically, the variations are extremely high from the drought period in the first part of autumn (minimum pluviometric) to the rainy period in the second part of autumn (secondary maximum pluviometric), then the solid and mixed precipitations during winter, the main maximum pluviometric during spring and first part of summer and in the last part of summer the droughty period usually returns. From germination and emergence up to harvest, during all vegetation stages phenomena of thermal and hydric stress occur, representing critical period for plants, caused by natural climatic variations (Sandu & all 2010). We will further analyze the climatic and agroclimatic aspects of the agricultural year 2011-2012.

¹ Regional Meteorological Center Oltenia, e-mail: ionmarinica@yahoo.com

²B.Sc., Jacobs University Bremen, Germany, marinica.andreea@gmail.com.

2. Materials and Methods

For our research on this interval of analysis we used the data from Oltenia MRC Archive, NAM Bucharest (National Administration of Meteorology), maps drafted by the Laboratory of Agrometeorology (NAM), synoptic maps, data provided by the archive of satellite and radar images, as well as the facilities provided by Office.

3. Results and Discussions

3.1. The warmish and droughty autumn of 2011. The thermal regime of the autumn of 2011.

The seasonal average values were comprised between 9.1°C in Voineasa in the submountainous area and 12.6°C in the south-west and west of Oltenia Dr. Tr. Severin and Calafat. Their deviations from the multiannual means calculated for the interval 1901 – 1990 were comprised between -0.9°C in Slatina and +1.9°C in Voineasa. The classification of thermal time type for this autumn, according to Hellmann Criterion were comprised between normal (N) in most of the region and warm (W) in Voineasa. The seasonal mean calculated for the entire region was 10.8°C, and its deviation from the normal was 0.3°C which leads to the conclusion that the average autumn was thermally normal (N). However, September imposes itself as a warm month (W) for the entire region, according to the monthly means and their deviations.

The thermal regime of September 2011. The monthly temperature means were comprised between 18.5°C in Bâcleș and 22.8°C in Calafat, and their deviations from the monthly multiannual temperature means were comprised between 0.9°C in Slatina and 9.3°C in Voineasa, designating a thermal regime comprised between normal (N) in Slatina and very warm (VW) in Băilești, Tg. Logrești, Polovragi, Voineasa, Parâng and Ob. Lotrului.

The general mean deviation for the entire region was 3.9°C, which designates a warm month (W) for the entire region. *All days of September were summer days. Of all these a number of 18 days were tropical days, namely they had daily maximum thermal values $\geq 30^\circ\text{C}$.*

The pluviometric regime of the autumn of 2011. The seasonal sums of precipitations registered in the autumn of 2011 were comprised between 14.0 l/m² in Bâcleș in Mehedințului Hills and 56.2 l/m² in Bechet in the south of Oltenia Plain. The percentage deviations of these deviations from the multiannual means were comprised between -90.3% in Bâcleș and -58.3% in Bechet which leads to a classification of the pluviometric time type at the meteorological stations in Oltenia as exceptionally droughty (ED) in the whole region, an aspect confirmed also by

the general mean for the entire region of 33.7 l/m^2 and its percentage deviation of -78.7%. The smallest values of temperatures were registered in November 2011 with values of 0 l/m^2 in most part Oltenia Plain and with a general mean for the entire region of 1.1 l/m^2 , being the *drougtiest month registered after 1950*, constituting a climatic record.

In the end of autumn, on 30 November 2011, in Oltenia the moderate drought (MD) was present on extended areas in the south-west, north-east of the region (*humidity reserve in the soil layer 0-50 cm between 300 and 600 m³/ha*) and in the most part of the region was satisfactory (SV).

3.2. Winter of 2011-2012. The thermal regime of the winter of 2011-2012.

The seasonal temperature means were comprised between -2.5°C in the Subcarpathian Depressions area in Apa Neagră and 0°C in Dr. Tr. Severin in the west of the region. Their deviations from the multiannual means were comprised between -1.5°C in Apa Neagră and -0.1°C in Băcleș, and according to Hellmann criterion the classification of thermal time type in this winter were comprised between cool (CO) in Bechet, Slatina, Apa Neagră and Parâng and normal (N) in most part of the region. December and January were warmish (WS) month, but February especially in the interval 1-15 February was excessively cold.

The thermal regime of February 2012. The monthly average temperature values in the air were comprised between -6.6°C in Caracal in the south-east of Oltenia and -3.9°C in Rm. Vâlcea in Olt Couloir, and their deviations from the multiannual means were comprised between -6.2°C in Bechet in the south of the region and -2.7°C in Voineasa, in the submountainous area. According to Hellmann criterion, the thermal time type in Oltenia were comprised between very cold (VC) in most part of Oltenia Plain in Tg. Logrești and in the Subcarpathian Depression Apa Neagră and cold (CL) in the high hills and mountainous area.

The minimum temperature values in the air were comprised between -28.9°C in Băilești and -17.9°C registered in Drăgășani both being registered on 1 February, and the monthly minimum temperatures mean was -23.1°C , lower than in January. *The minimum temperature values* in Calafat (-26.1°C), Bechet (-24.0°C), Băilești (-28.9°C) Tg. Logrești (-28.1°C), Apa Neagră (-28.4°C) and Obârșia Lotrului (-28.6°C), constituting *climatic records* for these stations, being the lowest of all the existent data.

The minimum temperature values at the soil surface were extremely low and were ranged between -23°C in Rm. Vâlcea and -32.2°C in Tg. Logrești, registered on 9 February, and at some meteorological stations on 1 and 2 February.

The thermal regime of the winter of 2011-2012. The seasonal precipitations values in this winter were comprised between 123.2 l/m^2 in Bechet and 232.9 l/m^2 in Apa Neagră, and their percentage deviations from the normal

values were extremely diverse and were ranged between -19.2% in Polovragi in the subcarpathian depressions area and 70.2 l/m² in Craiova in the central part of the region leading to a classification of pluviometric time types from droughty (D) in Polovragi and excessively rainy in Craiova. The general mean for the entire region was 148.8 l/m², and its percentage deviation from the normal general mean was of 8.5% which designates a pluviometric normal winter (N). The good pluviometric situation is due to the interval 24 January-10 February which was excessively rainy. December 2011 was excessively droughty (ED). January was excessively rainy also due to the aforementioned interval. February was very rainy (VR). In the end of winter, on 30 January *water reserve in the soil layer of 0-100 cm* was almost optimum (ApO) in most part of the region and optimum in the central part of the region.

The pluviometric regime in the winter of 2012. *The seasonal quantities of precipitations* were comprised between 44.0 l/m² in Caracal and 207.3 l/m² in Apa Neagră, and their deviations from the multiannual means were comprised between -73.7% in Caracal in Romanașilor Plain and -10.6% in Apa Neagră. There was one exception in Bâcleș in Mehedințiului Hills where it was 28.1% due to the local conditions which favored some significant showers on a very restricted area, which leads to a classification of pluviometric time types in the summer of 2012 from very droughty (VD) to exceptionally droughty (ED) in most part of the region (81.3% of the territory). There is one exception in Bâcleș where the summer was very rainy (VR), but on a restricted area. The drought intensity was small in the areas of Rm. Vâlcea and Apa Neagră where it was droughty (D) and little droughty (LD) due to the conditional local too. *The water reserve in the end of August* in the unirrigated corn crop, on the soil depth of 0-100 cm registered low and extremely low values, the pedological drought being moderate (MD), severe (SD) and extreme (ED), on almost all agricultural territory of the country, and in Oltenia the extreme drought (ED) and severe drought (SD) was extended in all the region, excepting the north-east of Vâlcea county where the drought was moderate (MD).

3.3. Spring of 2012. The thermal regime of the spring of 2012.

The seasonal temperature means in this spring were comprised between 9.1°C in Voineasa and 14.2°C in Băilești in Oltenia Plain. Their deviations from the multiannual means were comprised between 1.3°C in Slatina and 2.7°C in Apa Neagră which leads to a classification of thermal time types from warm (W) in most part of the region to very warm (VW) in Băilești and Drăgășani. In detail, March and April were warm (W), and more warmish (WS) on average and normal (N) in the plain area. In March monthly maximum temperature values were registered in the last decade and were comprised between 21.3°C in Polovragi and 26.3°C in Bechet. There were registered two days with maximum thermal values $\geq 25^\circ\text{C}$ (summer days) on 18 and 19 March. *In April the monthly maximum*

temperature values were registered in the last five days of the month and were ranged between 26.6°C in Bâcleș and 29.3°C in Dr. Tr. Severin. In May the *monthly maximum temperature values* in the air were comprised between 28.1°C in Polovragi and 33.0°C in Calafat, and most of them were registered on 12.

The pluviometric regime of the spring of 2012. *The seasonal temperature means* were comprised between 121.9 l/m² in Caracal in Romanașilor Plain and 461.4 l/m² in Polovragi in the subcarpathian depressions area. The deviations of these quantities from the normal values were comprised between -20.5 l/m² in Voineasa and 236.2 l/m² in Polovragi. We notice only two negative deviations: in Voineasa and in Caracal in Romanașilor Plain (-20.3 l/m²). The general mean for the entire region was 237.4 l/m², designating the spring of 2012 as the rainiest season of this agricultural year. The percentage deviations were ranged between -14.3% in Caracal and 104.9% in Polovragi, which leads to a classification of pluviometric time types from little droughty (LD) in Caracal and Voineasa and exceptionally rainy in Craiova, TG. Logrești and Polovragi. The deviation of the general mean from the normal was of 58.9 l/m², which leads to the classification of a very rainy spring (VR). March is an excessively droughty (ED) month in Oltenia area, April a very rainy (VR) month and May excessively rainy (ER) in all Oltenia with a general mean of 149.6 l/m² and a deviation from the normal of 69.6 l/m² (86.9%).

In the end of May (30 May 2012), *the water soil reserve* which is accessible to the autumn wheat plants *on the depth of 0-100 cm* was optimum (O) in the north of the region, almost optimum (AO) in the median part of the region and almost satisfactory (AS) in the south-east of the region.

On the *soil depth of 0-50 cm*, on the same date, the water soil reserve in the corn crop was excessive (E) in the north-west of the region, optimum (O) in the north-east of the region and extreme south (Bechet area) and almost optimum (AO) in the southern half, and almost satisfactory (AS) in the extreme south-east of Romanașiiului Plain.

3.4 Canicular and drought summer of 2012. Climatic aspects of June 2012.

Thermal air temperature regime in June 2012.

The monthly maximum temperature values were comprised between 32.2°C in Voineasa and 38.2°C in Bechet, and the monthly maximum temperature values mean for the entire region was 34.4°C.

The canicular days ($T_{\max} \geq 35^{\circ}\text{C}$) were registered in the southern half of the region and their number ranged from 1 in Slatina and Rm. Vâlcea to 5 in Calafat.

The scorching heat days ($T_{\max} \geq 32^{\circ}\text{C}$) were registered in the entire region excepting the submountainous area, and their number ranged from 1 in the subcarpathian depressions area in Polovragi and 14 in Calafat.

The monthly temperature means were comprised between 18.4°C in Voineasa and 25.0°C in Oltenia Plain in Băilești, and the general mean for the entire region was 22.1°C.

The deviations of the monthly temperature means from the multiannual means were comprised between 2.0°C in Bechet and 6.0°C in Apa Neagră, designating, according to Hellmann criterion, a warm month (W) in most part of the region, excepting the area Apa Neagră where there was a very warm month (VW), and the deviation of the general mean from the normal was 3.2°C confirming the classification of warm month (W) for the entire region. The chart of the air temperature means variation (daily minimum temperatures mean, daily temperatures mean, daily maximum temperatures mean) highlights the intense cooling from the first decade of the month on 7 June, the thermal minimum values decreased in general below 10°C, weather warming in the intervals 2-6 June, 8-11 June and the heat wave in the interval 16-23 June when the maximum thermal values often exceeded 35°C.

Precipitations regime in June 2012. *The monthly precipitations values in June* were comprised between 3.0 l/m² in Oltenia Plain in Băilești and 119.2 l/m² in Rm. Vâlcea in Olt Couloir. Their deviations from the multiannual means were comprised between -95.5% in Băilești and 37.2% (the only positive deviation) in Rm. Vâlcea.

According to Hellmann criterion the month is exceedingly droughty (ED) in most part of the region excepting some restricted areas: Bechet where there was a normal month (N), Voineasa and Bâcleș where there was a droughty month (D) and Rm. Vâlcea where there was a very rainy month (VR).

The drought occurred beginning with 1 June, since the weather with quantitatively insignificant rains, associated with average temperatures and high daily maximum temperatures has started even from 28 May. *The intensity of drought was maximum* in Oltenia Plain where there were registered the lowest quantities of precipitations (Calafat 9.2 l/m², Băilești 3.0 l/m², Craiova 7.2 l/m²). *In the water reserve in the end of June* of the unirrigated corn crop, in the water supply on the soil depth of 0-50 cm, there were registered high deficits of humidity in soil, the pedological drought being moderate (MD) and severe (SD).

Climatic aspects of July 2012. Air temperature regime in July 2012. *The monthly maximum temperature* were comprised between 35.3°C in Voineasa and 41.6°C in Calafat, and the monthly maximum temperature values mean for the entire region was 37.9°C.

The canicular days (T_{max}≥35°C) were registered in the entire region and their number ranged from 1 in Voineasa and 20 in Caracal and the average number of canicular days for the entire region was 13. In Oltenia Plain, the number of canicular days ranged between 16 and 20. *The scorching heat days* (T_{max}≥32°C) were registered in the entire region including in the submountainous area, and their

number ranged from 10 in Voineasa and 29 in Caracal, and the average number of the scorching heat days for the entire region was 23. *The monthly temperature means* were comprised between 20.7°C in Voineasa and 28.4°C in Oltenia Plain in Băilești, and the general mean for the entire region was 25.6°C, showing that July was the most warmish month of the summer of 2012. The monthly temperature means registered in July 2012 have been the highest means in the last 52 years for all the meteorological stations in Oltenia, and the general mean for the entire region of Oltenia was 25.6°C showing that ***Oltenia have been one of the warmest areas in the country in July 2012***. The monthly temperature mean for the entire country was 23.7°C being the highest mean not only in the last 12 years, but even in the last 52 years. *Regarding the northern hemisphere*, we also notice that on the American continent July 2012 has been the warmest month in the USA since 1895 up to the present (according to BBC). The average temperature in the USA was 25.3°C, breaking the previous record established in July 1936, when there was registered an extremely warmish weather and a severe drought desertifying extended areas and causing many dust storms, and thus an extended area was called “the dust bowl”. The drought associated with the excessive heat extended in all the American states in the centre and south of the country up to California – North Dakota – Texas. Many crops were badly damaged by the lack of water. *The deviations of the monthly temperature means* from the multiannual means were comprised between 3.6°C in Voineasa and 5.7°C in Apa Neagră, designating, according to Hellmann criterion, a warm month (C) in most part of the region, excepting the areas Băilești, Caracal, Drăgășani, Apa Neagră, Polovragi, Rm. Vâlcea and Parâng where it was very warm (VW), and the general mean deviation from the normal was 4.7°C confirming the intensification of warm month (W) for the entire region. *The chart of the air temperature means variation* (daily minimum temperatures mean, daily temperatures mean, daily maximum temperatures mean) highlights weather cooling in the interval 16-20 July when, the thermal minimum values decreased in general below 15°C, and in some hilly and submountainous areas below 10°C, and weather warming in the intervals 3-5 July, 7-11 July, 14-16 July, 18-22 July, 24-26 July, 28-30 July when the thermal maximum values often exceeded 35°C and 40°C.

Precipitations regime in July 2012. The monthly precipitations values registered in July 2012 were comprised between 13.2 l/m² in Caracal in Romanașilor Plain and 156.8 l/m² in Apa Neagră in the Subcarpathian Depression.

The deviations of these quantities from the multiannual mean were comprised between -60.2 l/m² in Rm. Vâlcea and +84.1 l/m² in Apa Neagră, and the percentage deviation between -75.5% in Caracal and +115.7% in Apa Neagră, leading to the pluviometric time type classification from exceedingly droughty (ED) to exceedingly rainy (ER).

The general mean of precipitations calculated for the entire region was 52.6 l/m², and its percentage deviation from the normal was -19.1% leading to a

general classification for the entire region as a little droughty month (LD). This classification due to the general mean is not so significant since the drought was intense on extended areas in Oltenia Plain, in Getic Piedmont, in the hilly area (Drăgășani, Tg. Logrești, Polovragi, Rm. Vâlcea, Voineasa) and on restricted areas, due to the local conditions and the penetration of some cloudy cells associated to some atmospheric fronts, which evolved in the north of Carpathians, July was exceedingly rainy (ER) (Dr. Tr. Severin, Bâcleș, Apa Neagră) or rainy (R) (Tg. Jiu). *Water reserve in the end of July* in the unirrigated corn crop registered low values (moderate pedological drought -MD) and extremely low (severe pedological drought -SD and extreme-ED) on almost entire agricultural territory of the country. Soil water supply was within almost satisfactory limits (AS) in most part of the north-west of Oltenia.

Climatic aspects of August 2012. Air temperature regime in August 2012. *The monthly maximum temperature* were comprised between 36.7°C in Voineasa and 41.2°C in Calafat and Bechet, and their mean for the entire region was 38.5°C. ***The value of 41.2°C registered in Calafat and Bechet is the absolute thermal maximum value of August for these meteorological stations*** constituting a climatic record for the entire region. Absolute thermal maximum values for those stations were also the values 40.8°C in Dr. Tr. Severin, 40.7°C in Rm. Vâlcea, 40.5°C in Băilești and Caracal, 39.6°C in Sintina, 39.8°C in Craiova, 38.7°C in Drăgășani, 37.7°C in Tg. Logrești, 36.7°C in Voineasa, 36.5°C in Plovrăgi, 28.0°C in Parâng in the mountainous area, which constitute a climatic record for these stations, being the highest temperatures in the last 52 years. *The canicular days* ($T_{max} \geq 35^{\circ}\text{C}$) were registered in the entire region and their number ranged from 3 in Voineasa to 15 in Calafat, and their mean for the entire region was 10.

The scorching heat days ($T_{max} \geq 32^{\circ}\text{C}$) were registered in the entire region including in the submountainous area, and their number ranged from 9 in Voineasa and 23 in Calafat, and their mean was 16.

The monthly average temperatures were comprised between 18.3°C in Voineasa and 26.3°C in Băilești, and their deviations from the monthly multiannual means calculated for the interval 1901-1990 were comprised between 1.7°C in Tg. Logrești and 3.8°C in Băilești, which according to Hellmann criterion leads to the thermal time type classification of warm month (W) in most of the region.

Monthly air temperature mean, calculated for the entire region was 23.6°C, and the deviation from the multiannual mean for the entire region was 3.1°C, confirming the general classification of warm month (W). Compared to July, the monthly mean was lower in August, as a consequence of the long cooling intervals, and the maximum temperature of the summer of 2012 was registered in July, and in the entire country the thermal maximum value of the summer of 2012 was ***42.4°C in Giurgiu registered on 15 July 2012.***

The chart of the air temperature means variation (daily minimum temperatures mean, daily temperatures mean, daily maximum temperatures mean) highlights two heat waves in the intervals 4-9 August and 20-25 August and two weather cooling intervals: 10-16 August and 26-29 August.

Pluviometric regime in August 2012. The monthly precipitations registered in August 2012 were comprised between 0.0 l/m² in Calafat and 48.7 l/m² in Bâcleș in Mehedinți Hills. Their deviations from the multiannual means (calculated for the interval 1901-1990) were comprised between -100.0% in Calafat and -23.3% in Băilești, which according to Hellmann criterion leads to an exceedingly droughty month (ED) in most of the region, confirmed also by the general mean deviation from the normal.

Drought occurred in the entire region, and its effects were extremely significant in August, as a consequence of the high precipitations deficit associated with canicular heat and scorching heat during long intervals of time.

Water reserve in the end of August in the unirrigated corn crop, on the soil depth of 0-100 cm, registered low and extremely low values, the pedological drought being moderate (MD), severe (SD) and extreme (ED) on almost the entire agricultural territory of the country, in Oltenia the ED and SD was extended in the entire region, excepting the north-east of Vâlcea county where there was a MD.

General climatic aspects of the summer of 2012. Air temperature regime in the summer of 2012. *The seasonal air temperature means* were comprised between 19.1°C in Voineasa in the submountainous area and 26.6°C in Băilești in Oltenia Plain, and their deviations from the multiannual means were comprised between 2.9°C in Voineasa and 5.0°C in Apa Neagră, leading, according to Hellmann criterion to a classification of a very warmish summer (VW) in most of the region with a single exception in the area Apa Neagră where the summer was exceedingly warmish (EW).

On the whole, the summer of 2012 was very warmish (VW), an aspect also confirmed by general mean deviation from the normal of 3.7°C. *The number of canicular days* ranged from 4 in Voineasa to 36 in Calafat and Bechet, in Oltenia Plain where 25.6% of the summer days were canicular.

The number of scorching heat days ranged from 21 in Voineasa in the submountainous area and 63 in Calafat and Bechet in Oltenia Plain where 68.5% were scorching heat days, showing the high duration and intensity of the thermal stress on crops.

Pluviometric regime in the summer of 2012. *The seasonal quantities of precipitations* were comprised between 44.0 l/m² in Caracal and 207.3 l/m² in Apa Neagră, and their deviations from the multiannual means were comprised between -73.7% in Caracal in Romanașilor Plain and -10.6% in Apa Neagră, with a single exception in Bâcleș in Mehedinți Hills where it was 28.1%, due to the local conditions which favoured some quantitatively significant showers on a very restricted area. This leads to a pluviometric time type classification from very

droughty (VD) to exceedingly droughty (ED) in most of the region (81.3% of the territory) in the summer of 2012. There is only one exception in Bâcleș where the summer was very rainy (VR), but on a restricted area. The intensity of drought was lower in areas Rm. Vâlcea and Apa Neagră where the summer was droughty (D) and little droughty (LD) due to the local conditions.

3.5. Synoptic causes leading to this droughty summer.

This exceedingly warmish and droughty summer was caused by the blocking circulation, which acted on most of the European continent. The blocking anticyclonic ridge stood with the upward part during all summer over most of Europe causing the advection of the warm and dry air from the north of Africa over the continent. The downward part of the ridge was generally located on the continent eastern extremity where the advection of the cool or cold and moist air from north and north-east caused abundant rains. This type of circulation also caused the predominance of the southern-western tropospheric stream over most of the continent which favoured its maintenance. Warm air advection towards north causes in the same time the advance of the warm ridges towards north, which would explain quite well the maintenance of the Azoric anticyclonic field over Europe during most of summer.

We further state that it is well correlated with the persistence of the positive phase of the North-Atlantic Oscillation (NAO+).

The air temperature regime in the summer of 2012. The seasonal air temperature means were comprised between 19.1°C in Voineasa in the submountainous area and 26.6°C in Băilești in Oltenia Plain, and their deviations from the multiannual means were comprised between 2.9°C in Voineasa and 5.0°C in Apa Neagră, which leads, according to Hellmann criterion to a classification of a very warmish summer (VW) in most part of the region with one exception in Apa Neagră area where the summer was excessively warmish (EW). On the whole, the summer of 2012 was very warmish (VW), an aspect also confirmed by the deviation of the general mean from the normal value of 3.7°C. *The number of canicular days* was comprised between 4 in Voineasa and 36 in Calafat and Bechet, in Oltenia Plain where 25.6% of the summer days were canicular. *The number of canicular heat days* was comprised between 21 in Voineasa in the submountainous area and 63 in Calafat and Bechet in Oltenia Plain where 68.5% were canicular heat days, which shows the high duration and intensity of the thermal stress on crops.

3.6 The annual precipitations regime during the agricultural year of 2011-2012.

The annual precipitations sums registered in this agricultural year were comprised between 340.8 l/m² in Caracal in Romanașului Plain and 761.4 l/m² in Apa Neagră in the subcarpathian depressions area, and the *quantitative deviations*

from the multiannual means calculated for the interval 1901-1990 were comprised between -347.9 l/m^2 in Voineasa in the submountainous area and -46.4 l/m^2 in Craiova in the central part of Oltenia. The percentage deviation from the normal values were comprised between -44.9% in Voineasa and -8.7% in Craiova, which according to Hellmann criterion leads to a classification of an exceptionally droughty year in most part of the region excepting three restricted areas: Craiova where it was little droughty (LD) and Tg. Logrești and Rm. Vâlcea where it was droughty (D) due to the local conditions that, in some situations, caused some abundant precipitations.

*The precipitations mean for the entire region was 519.8 l/m^2 and its percentage deviation from the normal value¹ was -23.4% , which confirms the classification of excessively droughty (ED) agricultural year. We conclude that **on the whole the agricultural year 2011-2012 was an excessively droughty year (ED), and the excessive drought was mainly registered in two essential periods: in autumn with the result that it prevents agricultural works from being carried out and crops from being set up in the optimum time and during all summer, namely in the periods in which there is a maximum need of water.** Drought was associated with high temperatures, sun glow and canicular heat during extended periods of time.*

4. Conclusions

On the whole of the agricultural year, 2011-2012 was an excessively droughty year (ED), and the excessive drought was mainly registered in two essential periods: in autumn with the result that it prevents agricultural works from being carried out and crops from being set up in the optimum time and during all summer, namely in the periods in which there is a maximum need of water. Drought was associated with high temperatures, sun glow and canicular heat during extended periods of time.

*The droughty pluviometric time type (DT)) predominated 63.5% of the year and the region area, the rainy time (RT) 38.6% of the year and the region area, and the normal time (NT) only 6.2%. During all year, the *thermal stress* have been intense not only in autumn, but also in summer and winter in the interval 25 January-15 February, the temperatures falling under the plants' critical thresholds of resistance to frost. As a consequences of the excessive droughty *the degree of crops damage* was high in all the country and especially in the extracarpathian area, not only in Oltenia.*

The Romanian Government decided to help the countrymen and farmers by drafting GD 897/2012, consisting in awarding financial aids for the drought

¹ *The multiannual means* for the interval of 90 years 1901-1990 are considered *normal values*.

destructive effects. *The losses of wheat crop* in the entire country were 600 thousands of tones less compared to the mean of the last years. The losses of *sunflower crops* were about 40-45% of production, and in what the oil content is concerned, the reduction was about 3-4%.

The losses of *vegetables-fruits* were about 40%. The producers' losses, because of the damages caused by the drought, were 2,5 billions of euros or more, and the aid to hectare given by the Ministry of Agriculture represented a recovery of only hundreds of millions of euros. All these led to the *raise in prices of agricultural products and of the cost of living in general*, especially given that there have been registered damages in the domain of electricity generation too (Hidroelectrică company registered losses of 253 million of euros or more), and the electricity consumption during summer was high mainly as a consequence of the use of air conditioning.

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