TREND OF THE EVOLUTION OF DAILY PRECIPITATION IN THE CONDITION OF PROBABLE CLIMATIC CHANGES IN THE DEALUL BUJORULUI VINEYARD

TENDINȚA EVOLUȚIEI PRECIPITAȚIILOR ÎN PODGORIA DEALUL BUJORULUI ÎN CONDIȚII DE SCHIMBĂRI CLIMATICE PROBABILE

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Abstract. *The evolution of the precipitations in the Dealul Bujorului vineyard was studied during 1980-2016. The periods 1980-2006 and 2007-2016 were compared. We analyzed the frequency of torrential rains, rainfalls, rainfall surplus / rainfall both during the vegetation period and during the winter. All these observations and determinations will allow the assessment of the consequences of extreme precipitation under the current climate change conditions. From the data analyzed was observed a tendency to accentuate the rainfall events during certain periods (increased frequency of extreme rains, torrential rain followed by long periods with rainfall, increasing the frequency of non-worthwhile rains).*
Key words: climate risk, vine, precipitations, rainfall deficit

Rezumat. *S-a studiat evoluția precipitațiilor în podgoria Dealul Bujorului în perioada 1980-2016. S-a luat comparativ perioadele 1980-2006 şi 2007-2016. S-a analizat frecvența ploilor torențiale, a ploilor valorificabile, a excedentului / deficitului de precipitații atât pe perioada de vegetație cât şi pe perioada de iarnă. Toate aceste observații şi determinări vor permite evaluarea consecințelor precipitațiilor extreme in condițiile actuale de modificare a climei. Din datele analizate s-a observat o tendință de accentuare a evenimentelor pluviale pe anumite perioade (creşterea frecvenței ploilor extreme, ploi torențiale urmate de perioade lungi cu deficit pluviometric, creşterea frecvenței ploilor nevalorificabile).*
Cuvinte cheie: risc climatic, viță de vie, precipitații, ploi torențiale

INTRODUCTION

Today we are assisting the global climate change due to global warming caused by the greenhouse effect. Climate change has been manifested more and more often in recent decades by increasing air temperature, the considerable reduction in atmospheric precipitation (rainfall and snowfall) and extreme weather phenomena (Enache *et al*, 2007). Analysis of climatic data over long periods has shown a climate change trend. Simulations with complex global climate models indicated that the phenomenon is determined by both natural and anthropogenic factors (IPCC, 2007). According to the researches, it is concluded

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that the air temperature may rise by 0.1°C/decade in the coming decades. Also, in the 2007 ICPP report it was mentioned that an essential feature of the temporary variability of precipitation amounts is the between decades component that makes it difficult to separate the long-term climate signal. The indicators regarding intense rainfall generally showed an increasing trend in winter and a downward trend in summer. In spring and autumn, clues have seen an increasing trend, but not as in winter (Yeshewatesfa Hundecha, Andras B"Ardossy, 2005).

Based on these considerations, the paper aims to present the trend of the precipitation evolution in the Dealul Bujorului vineyard analyzing a series of data from the 1980-2006 periods taking as 2007-2016.

MATERIAL AND METHOD

The research was carried out within the Research and Development Station for Viticultural and Winemaking Bujoru. Data on daily, monthly, and annual average precipitation were processed and analyzed. In order to evaluate the precipitation evolution trend, the data was collected from the Tg. Bujor weather station (AGROEXPERT system). Were analyzed the evolution of monthly and annual rainfall, during the winter and vegetation period, the precipitation rate greater than 10 mm, greater than 5 mm and less than 5 mm, the frequency of torrential rains relative to the total number of higher rainfalls 5 mm (useful rain). A comparative analysis was carried out between 1980-2006 and the reference period 2007-2016.

RESULTS AND DISCUSSIONS

In the figure 1 shows the annual precipitation over two time periods: 1980-2006 and 2007-2016**.** Annual precipitations were compared with the mobile media for 5 years and multi-annual average. The annual rainfall and precipitation during the vegetation period were distinct. The moving average for 5-year, indicates a declining rainfall trend and a growth trend over the period 2007-2016. Between 1980 and 2016, out of the total of 27 years, 10 years are below the multiannual average and 11 years below the multiannual average of the vegetation period. From these 11 years, 5 years have been with precipitation less than 250 mm (250 mm are necessary rainfall for vine cultivation during the vegetation period). Of the 10 years of the reference period 2007-2016, 3 years are below the multiannual average and 7 years below the multiannual average of the vegetation period of which 4 years with precipitation less than 250 mm. We observe that rainfall deficit is particularly high during the vegetation period. From the point of view of the monthly precipitation evolution, the number of rains smaller than 5 mm predominates in all months (fig. 2). In June, July and August the share of rain above 5 mm increased during the reference period 2007-2016 compared to the period 1980-2006 and the share of rain above 10 mm decreased. The monthly average of precipitation in the reference period 2007-2016 shows a downward trend in April, June, July and August and growth in the other months of the year (fig.3). The evolution of the monthly precipitation average reveals negative

deviations during the reference period 2007-2016 in April, June, July and August, with a maximum in August of 10,1mm and positive deviations in the other months (tab.1). The sum of the monthly precipitation from 2007-2016 is increasing compared to 1980-2006, with an average annual deviation of 73,1mm. In the reference period 2007-2016, the average positive deviation was registered in the winter and May. In the rest of the month the deviation was negative.

The rainfall recorded in the 37 years analyzed was differentiated as follows: rains below 5 mm, useful rains greater than 5 mm and more than 10 mm. Much of the precipitation had a torrential character and was not fully exploited by the soil. In the reference period 2007-2016 the torrential rains frequency is higher in June, July and August compared to the period 1980-2006. If during 1980-2006 the maximum torrential rainfall was recorded in June, in the reference period the maximum was 34,4% in July, followed by 24% in August. In April, May and September the torrential rains frequency is higher in the period 1980-2006 compared to the period 2007-2016 (fig.4).

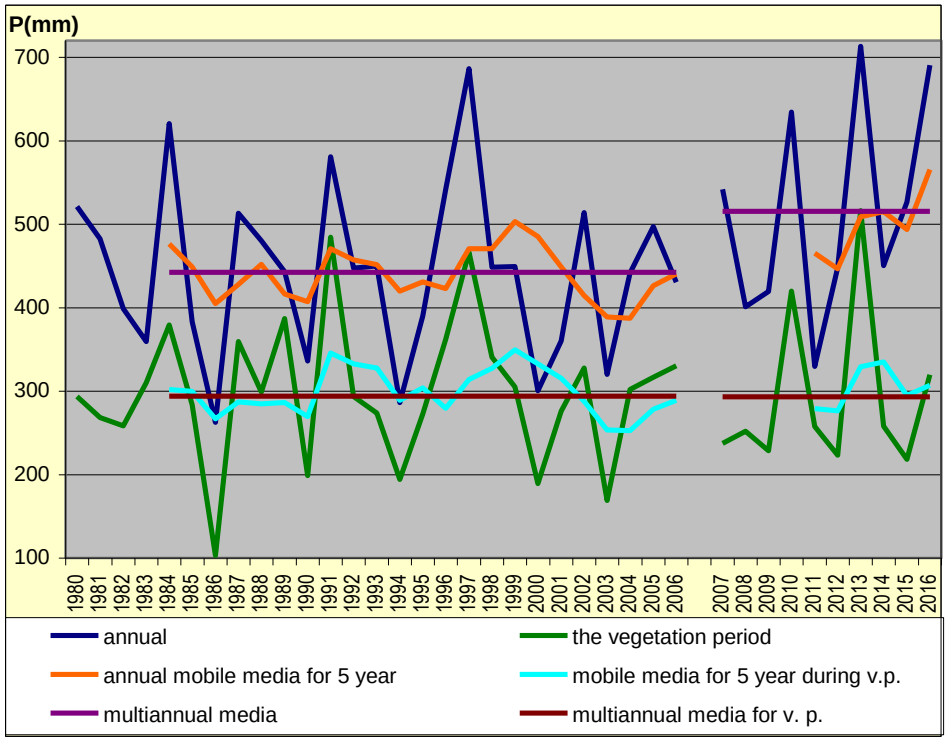

Fig. 1 Distribution of annual average precipitation between 1980-2006 and 2007-2016 period

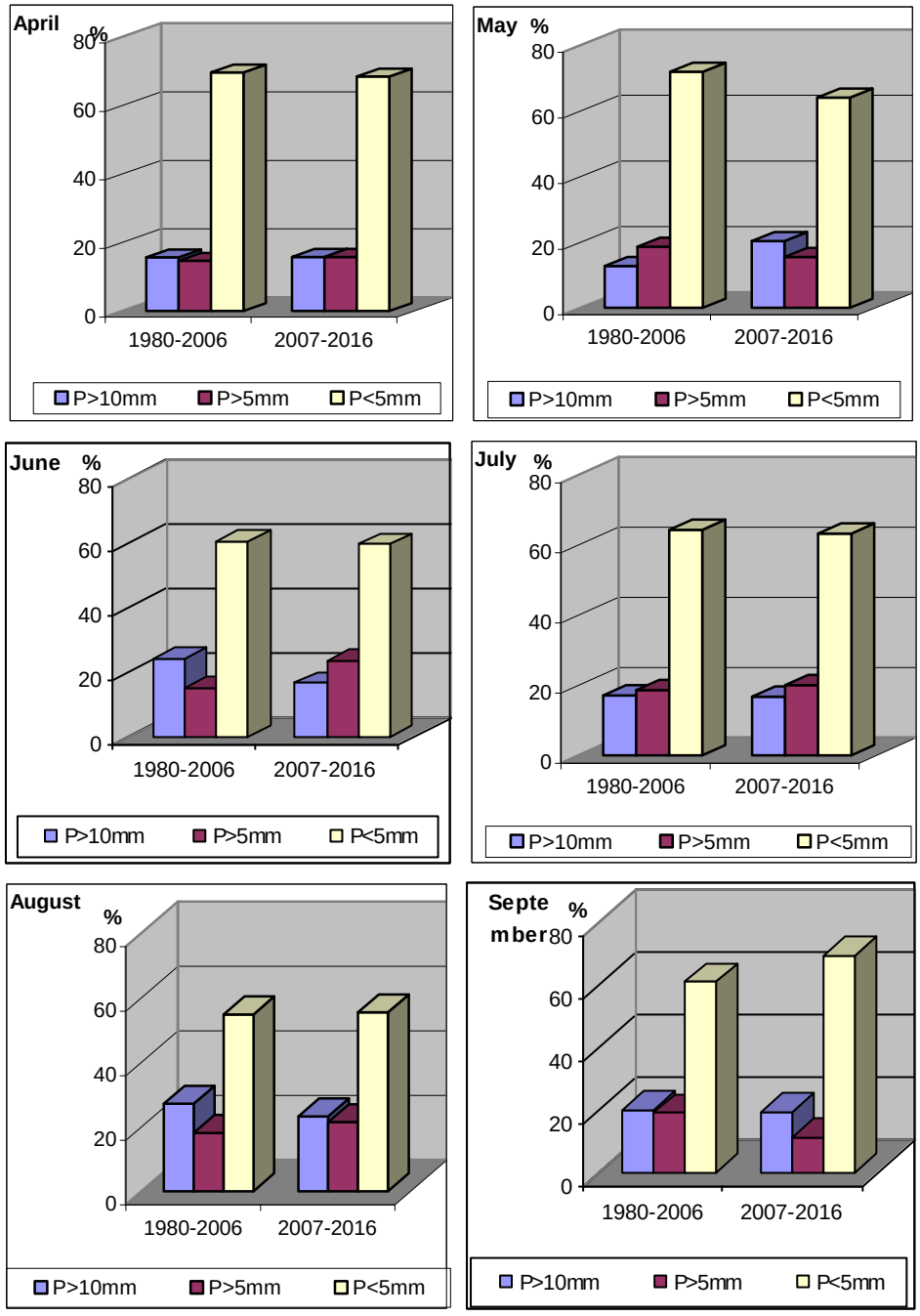

Fig. 2 Monthly precipitation rate P> 10mm, P> 5mm and P <5mm in the 1980-2006 interval and the 2007-2016 reference period

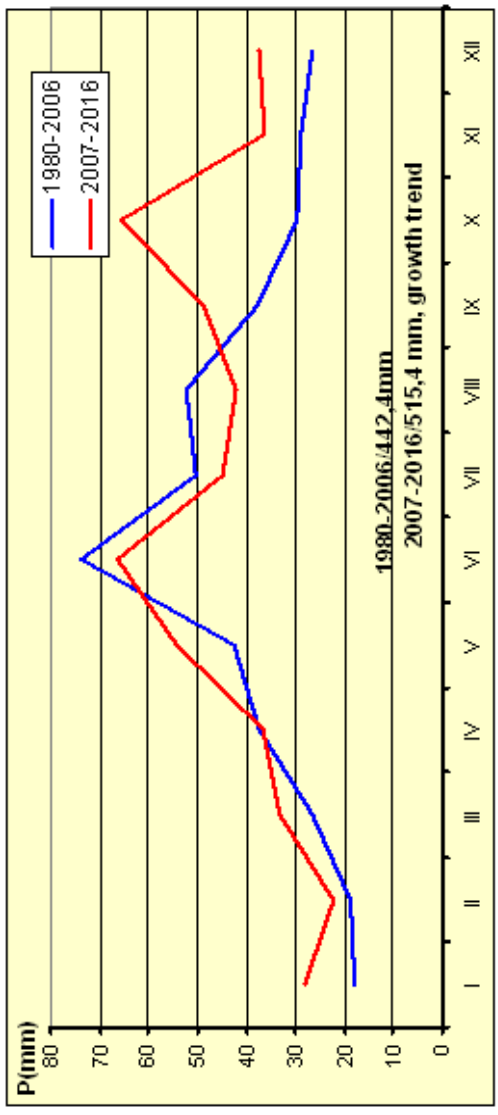

Fig. 3 Evolution of the average monthly rainfall in the Dealul Bujorului vineyard in the 1980-2006 periods compared to the 2007-2016 interval

The average of the monthly precipitation in the Dealul Bujorului vineyard in the period 1980-2006 as compared to the period 2007-2016

Table 1

Period	Monthly precipitation (mm)												Total
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
2007-2016	28.1	22.3	33.2	36.7	54.2	66.5	44.8	42.1	48.6	65.5	36.1	37.3	515.4
1980-2006	17.9	18.6	26.7	37.4	42.7	73.7	50.2	52.2	37.8	29.5	28.8	26.7	442.4
deviation	10.2	3.7	6.5	-0.7	11.5	-7.2	-5.4	-10.1	10.8	36.0	7.4	10.6	73.1

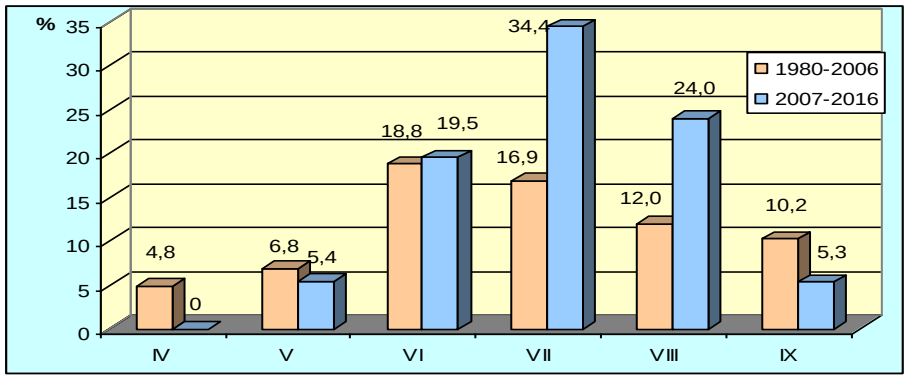

Fig. 4 Frequency of torrential rains relative to total rainfall greater than 5 mm

CONCLUSIONS

Comparing the 1980-2006 period with the reference period 2007-2016, it was found that:

1. The rainfall deficit has been particularly accentuated during the vegetation period of the reference range.

2. The share of useful rainfall (> 5 mm) in June, July and August increased during the reference period 2007-2016 compared to the 1980-2006 interval and the share of rain above 10 mm decreased.

3. The sum of the monthly precipitation from 2007-2016 is increasing compared to 1980-2006, with a positive average annual deviation of 73,1mm.

4. The monthly average rainfall for the reference 2007-2016 periods shows a downward trend in April, June, July and August and growth in the other months of the year compared to the 1980-2006 period.

5. Between 1980 and 2006, the maximum torrential rainfall was recorded in June and in the reference period the maximum moved to July (34.4%), followed by August (24%).

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