Bulletin of the *Transilvania* University of Braşov
Series II: Forestry • Wood Industry • Agricultural Food Engineering • Vol. 4 (53) No. 2 - 2011

PARTICULAR ASPECTS OF THE RAINFALL REGIME IN VLĂSIEI PLAINS

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Abstract: *The paper presents the main characteristics of rainfall regime in the Romanian Plain, named Vlăsiei Plain, and explains the rainfall overflow, respectively the obvious favourability of rainfall regime in relation to forest vegetation, through interference phenomena of atmospheric circulations from east to west, within the context of the restructuration induced by the configuration of the major Romanian Carpathians peaks.*

Key words: *rainfall regime, atmospheric circulation interference, topo-climatic area.*

1. Introduction

All monographs or geography textbooks dealing with the plains contain aspects regarding the Romanian Plains, also known as (or named) the Low Danube Plain.

Romanian geographers divide the Romanian Plain into three sectors: western, central and eastern, each of them (Figure 1) being made up of subunits [1].

The subunits of the Romanian Plain central sector are represented by Vlăsiei Plain together with Ploieşti-Gherghiţa Plain, Târgovişte Plain, Titu Plain, Mostiştei Plain, Găvanu-Burdea Plain and Burnazul Plain [5].

Despite the apparent uniform relief to which the wide Romanian Plain belongs, most of the geographers consider Vlăsiei Plain to be an individualised physical and geographical area, with clearly delineated limits:

- to the west, south-west and south - Argeş River, up to its confluence with Dâmboviţa River;
- to the south-east - from Argeş-Dâmboviţa confluence, through Brăneşti town, to the confluence of Ialomiţa-Prahova Rivers (Dridu village);
- to the north - Ialomiţa River up to Butimanu;
- to the north-west - Butimanu-Floreşti limit (Argeş Valley).

A characteristic of Vlăsiei Plain is its fragmentation by numerous wide valleys and terraces - Argeş, Săbar, Dâmboviţa, Ialomiţa, Pasărea, Mostiştea and numerous lakes. At the end of 19th century (1980) there were 30 natural and 75 artificial lakes in Vlăsiei Plain. Due to increasing human changes of the landscape, the number of artificial lakes has grown up to 45 accumulation lakes (with an area of 1180 hectares) and 115 artificial lakes (with an area of 1220 hectares).

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Fig. 1. *The three sectors of the Romanian Plain* (*V - Western sector; C - Central sector - interference zone; E - Eastern sector*)

One important question arises with regard to the high amount of water resources in this plain (a dense hydrographical network, a lot of areas covered by lakes-2400 hectares, a rich network of ground waters in a plain of such low altitude, bordered by Bărăgan forest steppe and Bărăgan steppe in the east, Southern Muntenia forest steppe and Olteniei forest steppe and sands in the west).

By comparing the water richness of this central sector with the situation encountered in the Eastern neighbouring sector we can conclude that there is no water flow from Mostiştea and Gălăuți accumulations to Feteşti (Ialomița-Danube confluence), on a distance of 100 km.

We can also raise the question of why in this central sector of the Romanian Plain, in the strip which descends from Piteşti, Târgovişte and Ploieşti hills to the Danube (including Vlăsiei Plain) the forests cover wide areas nowadays and the well-known Vlăsiei Forests used to stretch to the main Danube meadows in the past [3].

It looks like a miracle, but just as many important rivers - Argeş, Dâmbovița, Prahova and Ialomița - going down from the heights of Făgăraş and Bucegi Mountains to the Danube, joining on this blessed land where, by slowing down their flow, they form an endless chain of lakes which temper the harsher climate of the neighbouring Bărăgan, the natural conditions enable not only the survival of some vigorous oak forests but also the *ecological resistance of the beech* (in Snagov Lake area) [2].

Although we do not aim to give an exhaustive answer to these questions we aim to deal with some specific aspects related to the rainfall regime, induced by *the meteorological interference phenomena.*

2. Research Results

2.1. Particularities of rainfall regime in Vlăsiei Plain

Within the context of the real synoptic of atmospheric circulation restructuration induced by Romanian Carpathians configuration, particular meteorological phenomena such as eastern and western atmospheric circulation interference located in the central sector of Romanian Plain occur (the geographic space delimited as follows: Mizil, Urziceni, Valea Mostiştei border in the east; Olt River - in the west; Hills and Muntenia Sub-Carpathians - in the north; Danube's meadow - in the south - Figure 2).

Such interferential meteorological processes lead mainly to the increase in nebulosity and rainfall as well as to moderate wind speed and air temperature regimes.

On a climatic scale the rainfall overflow determines multiannual values greater than in the rest of Romanian Plain.

On the maps of *rainfall distribution for warm season months* the monthly isohyets form a buckle eastwards and southwards, highlighting the difference between the amount of rainfall in Bărăgan and the central sector of Romanian Plain [4].

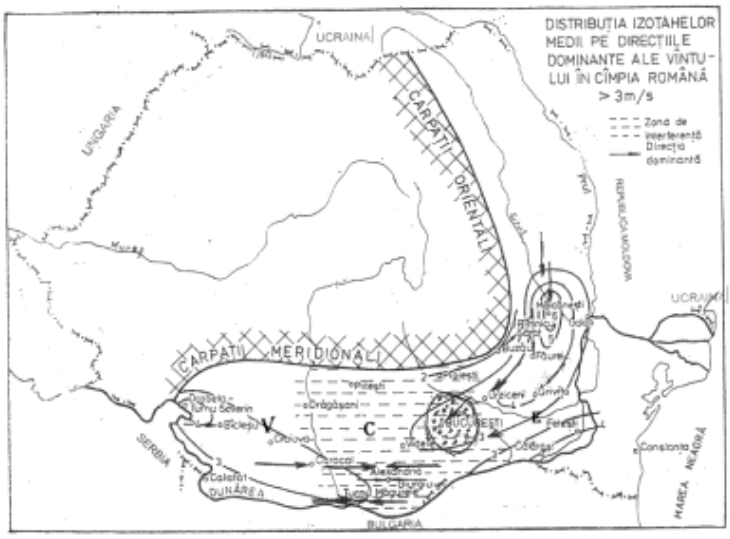

Fig. 2. *The eastern and western atmospheric circulation interference located in the central sector of Romanian Plain*

For example, in July, the isohyets of 60 mm extends up to Giurgiu (Figure 3), highlighting the interference zone.

Furthermore, in August, the area submitted to research is delimited by closed isohyets which cover the 50 mm area by excluding the rest of Romanian Plain (which gets only 40 mm).

As for the *annual amount* of rainfall, the 500 mm isohyets which follows the route Danube (Gălățui Lake) - Lehliu - Urziceni - Mizil clearly delimits the central-western sector of the Romanian Plain (including Vlăsiei Plain) from its eastern (south-eastern) sector, with a rainfall of 400 mm and even of <400 mm.

These particularities of the rainfall regime in Vlăsiei Plain can be explained through the high frequency of aero-synoptic situations which were mentioned

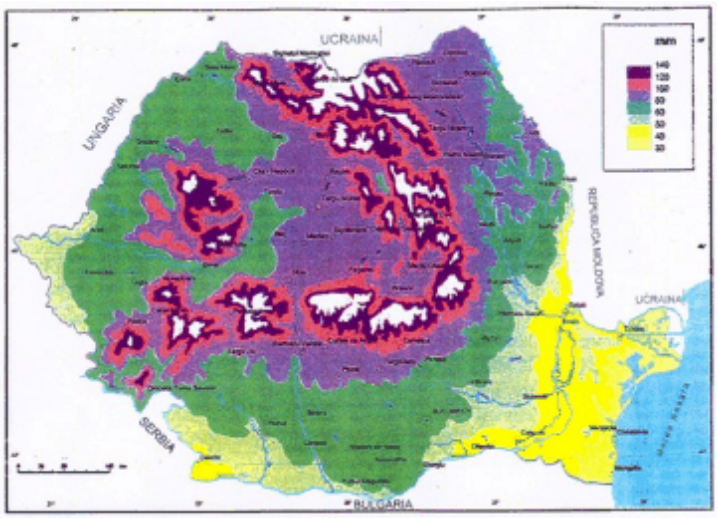

Fig. 3. *Territorial distribution of average rainfall amount in July for 1961-2000 periods* (*Romanian Clime, 2008*)

above - *the interference of eastern and western atmospheric circulation over the Romanian Plain central sector*. Figure 4 may stand as an example.

Under anticyclonic conditions in the north of our country, the heights of Eastern, Southern and Western Carpathians form an obstacle and facilitate penetrations of cold air which are stronger in Moldova and weaker in Tisa Plain under the form of specific anticyclonic lobes through which the cold air from northern Europe reaches the centre of the Romanian Plain following the twist of power lines in Curvature of the Carpathians. By interfering with the pre-existent or adverted air masses, the cold lobar invasion determines an accentuated atmospheric instability or

Fig. 4. *An example of barometric structure where the frequent eastern and western atmospheric circulations interferences in the central sector of Romanian Plain can be seen*

intensifies the existing one generating an *increased nebulosity and more frequent rainfalls* as compared to the rest of the Romanian Plain. The rainfall overflow from the area which includes Vlăsiei Plain results from rain downpour accompanied by frequent lightings which occur in every similar air-synoptic situation. On the climatic scale this overflow is added to the rainfall generated by other synoptic situations which may be applied to all the Romanian southern areas [6].

2.2. Particular meteorological phenomena. Exceptional troposphere instability. Torrential rains and hailstone

Provided cold air advections from north, crossing Moldova Plateau, gain twisting trajectories around Carpathians curvature, then reach the Romanian Plain where they meet humid and warm air masses, they determine a high vertical instability in Vlăsiei Plain with the following phenomenological consequences: strong rain downpour, lightings and hailstone.

A spectacular case occurred on 13th July 1979 in the north side of Bucharest city - an exceptional torrential rain with hailstone (with 6 cm in diameter). The situation recorded on ground (at 9 o'clock) did not foresee anything special; in altitude - tropical warm advection over the Southern of Romania, cold advection over the North-Eastern Romania, vertical thermal superadiabatic gradients in the inferior troposphere, high humidity, strong instability. At 5 pm a violent storm, lightning, exceptional torrential rain, hailstone (spherical and semi-flatted) with diameter between 3-6 cm - began [7].

3. Conclusions

The central sector of the Romanian Plain, respectively the Vlăsiei Plain is characterised by a more favourable rainfall regime than its location in the Romanian territory might indicate and compared to other Romanian southern areas.

The specific rainfall overflow of this climatic areal occurs within the context of the real synoptic of atmospheric circulation restructuration induced by Romanian Carpathians configuration and favoured by eastern and western interference circulations located in this physical and geographical district.

These favourable particularities of the rainfall regime corroborated with other soil and local climate characteristics have long represented a natural frame, which has enabled the stretch of the plain forest to the Danube meadow.

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