

ECOLOGICAL EVALUATIONS OF SOME CLIMATIC DATA

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Rezumat

Comparativ cu localitatea Suceava, Lucina se caracterizează printr-un climat mai răcoros. În ambele localități variabilitatea climatică anuală, lunară și decadală este semnificativă, mai ales la Suceava. Pentru o mai bună caracterizare ecologică a perimetrelor luate în studiu, s-a dovedit a fi utilă raportarea resurselor de apă comparativ cu necesarul evaluat cu ajutorul relațiilor elaborate de Burt și Klatt.

Cuvinte cheie: evaluări ecologice, condiții climatice

Abstract

In comparison with Suceava locality, Lucina can be characterized by a cooler climax. In both localities the annual, monthly and decadal climatic variability is significant, especially in Suceava. In order to make a better ecological characterization of the studied perimeter it proved useful the report of water resources comparative with the necessary evaluated with the help of relationships elaborated by Burt and Klatt.

Key words: ecological evaluations, climatic conditions

Résumé

En comparaison avec la localité Suceava, Lucina se caractérise par un climat plus froid. Dans les deux localités la variabilité climatique annuelle, mensuelle et en décades est signifiante, surtout à Suceava. Pour une meilleure caractérisation écologique des périmètres étudiés, on a prouvé d'être utile le rapport des sources d'eau en comparaison avec le nécessaire évalué à l'aide des relations élaborées par Burt et Klatt.

Mots clef: évaluations écologiques, conditions climatiques.

Introduction

In the actual stage, when thanks to the contribution of a great number of researchers we now dispose of multiple possibilities of evaluation of the meteorological data; it is imperiously imposed passing to a newer qualitative stage in this field. The appreciation of the meteorological conditions with the help of differences towards a certain value of reference hasn't brought and won't bring any information regarding their favorability. This is because the multi-annual average of a temporal sequence does not express in no way the measure in which it was assured the plants' demands towards a certain meteorological factor. (SCURTU, and collaborators, 1996).

More useful information is obtained when the analyses of some climatic values refer to shorter stages (decades, pentads).

We can underline that the diversity of criteria of appreciation of the precipitations regime and of other features of the atmosphere near the vegetal carpet is useful by the information that are especially obtained and that refer to the intensity of some phenomena. Any way, the use of some analytic and synthetic estimators, that regard some meteorological parameters, is more useful than the simple analysis of some current values' digression towards a certain average. (SCURTU, and collaborators, 1996).

Experimental

The analysis of the frequencies of some meteorological phenomena or of some average climatic values can offer information that could suggest some precautions in taking some agronomic decisions concerning the cultivation of the precocious and late genotypes, the frequency of some

diseases, the quality of products, and also the opportunity of some investments for conserving the products, the diminishing of deficit or the excess of water, etc.

In this purpose we have effected some ecological evaluations of the climatic data from the Lucina locality (altitude of 1400 m) and in Suceava (altitude approx. 400 m) for a period of 3 years, taking into study only the favourable months for the plants vegetation.

In order to illustrate the possible influences of the main meteorological conditions (precipitations, temperature) have been selected some estimations of the necessary of precipitations, taking into account only the influence of temperature over the intensity of the evapor-transpiration, the relations elaborated by Burt and Klatt.

The Burt's relation is presented by the formula: $n_p = n \cdot k^t$ where

n_p = necessary of precipitations

n = number of days from the analyzed period

k^t = coefficient that for our country has the value of 1,04

This relation is more adequate for the areas dominated by soils with a greater capacity of retaining the water.

The monthly necessary of precipitations according to the temperature of air, from the hot season could be evaluated by Klatt's estimator which is: $n_p = 2t + 0,2 t^2$ where

n_p = necessary of precipitations

t = average temperature of air from the meteorological protector

This formula is more suited for the areas with light soils, whose capacity of storing the precipitations is lot more diminished in comparison with the soils with smooth texture.

Results and discussion

The data written in Table 1 underline the fact that Lucina locality is characterized by a cooler climate in comparison with the one that characterizes the Plateau of Suceava. In the same time it is emphasized the fact that the thermal restrictions from Lucina present a real annual variability.

Table 1: Comparisons between Lucina and Suceava localities

Month	Mma*	Years		
		1997	1998	1999
Year Average Temperature(°C)				
IV	-2,6	-0,7	-5,4	-4,4
V	-3,4	-5,6	-2,7	-3,3
VI	-3,7	-4,7	-1,7	-4,6
VII	-4,3	-1,5	-1,4	-3,6
VII	-4,5	-4,1	-1,9	-3,9
Quantity of precipitations (mm)				
IV	7	24	127	-29
V	28	-27	-3	35
VI	23	6	-18	57
VII	33	-6	11	67
VII	25	84	113	20

* Mma – multi-annual average

This aspect is certified by the fact that in 1998, the thermal deficit from April – August has registered smaller values (they were often between 1, 4 – 2, 4 °C), comparative with 1997 and 1999 years, when the differences between the 2 localities have been greater (3,3 - 4,7 °C).

Table 2: Temperature of air at Lucina (°C)

Month	Decade	1997		1998		1999		Mma ***
		R*	A**	R*	A**	R*	A**	
IV	1	2,6		3,7		3,6		
	2	2,1		5,8		4,1		
	3	5,5		7,1		6,7		
	monthly	3,4	-2,0	5,5	-	4,8	-0,6	5,4
V	1	8,1		10,6		7,7		
	2	14,1		9,3		8,9		
	3	6,8		11,6		11,3		
	monthly	9,7	-0,6	10,5	0,2	9,3	-1,0	10,3
VI	1	10,9		18,6		14,3		
	2	12,2		14,8		15,1		
	3	14,9		17,2		16,0		
	monthly	12,7	-0,7	16,9	3,5	15,1	1,7	13,4
VII	1	16,3		14,8		17,1		
	2	15,5		17,6		16,8		
	3	18,7		20,1		17,7		
	monthly	16,8	2,5	17,6	3,3	17,2	2,9	14,3
VIII	1	14,3		20,5		15,6		
	2	13,0		16,8		14,6		
	3	12,5		12,3		14,2		
	monthly	13,3	-0,1	16,4	3,0	14,8	1,4	13,4

*R - registered

**A – anomaly

*** Mma - multi-annual average

The consequence of important thermal restrictions (Table 2 and 3) is reflected significantly over the botanical composition of spontaneous flora. Among the dominant herbaceous species are particularly those that belong to cereal crops, as in which concerns the presence of pulse (legumes) is consigned only sporadically.

In other words improving the quality of epigeic phyto- weight, used for animal foddering, it's possible only by some sustained financial efforts. The thermal differences between the two localities suggests also that the vulnerability of the eco-system from Lucina is significantly bigger than that from Suceava, when the entropic intervention doesn't take into account this ecological component of natural frame.

For the evaluation of the advantageous pluviometric regime, we often compare the annual or monthly values with the multi-annual of these temporal sequences. Proceeding in this way we can estimate only the size and the sense of the annual anomalies in comparison with the average of the locality. And because very rarely the average of a locality represents the water necessary for the normal growth of plants, any measure for evaluating this one represents a progress to a better ecological characterization of the natural frame.

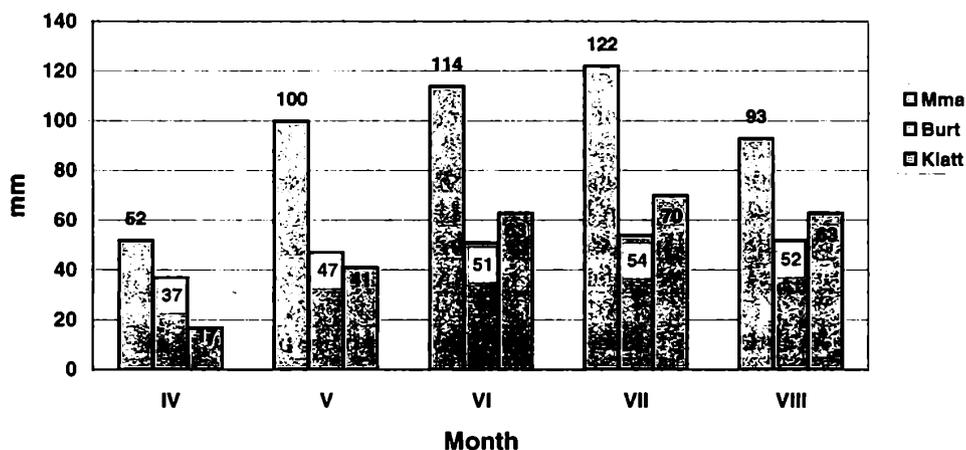
Table 3: Temperature of air at Suceava (°C)

Month	Decade	1997		1998		1999		Mma ***
		R*	A**	R*	A**	R*	A**	
IV	1	2,6		3,7		3,6		
	2	2,1		5,8		4,1		
	3	5,5		7,1		6,7		
	monthly	3,4	-2,0	5,5	-	4,8	-0,6	5,4
V	1	8,1		10,6		7,7		
	2	14,1		9,3		8,9		
	3	6,8		11,6		11,3		
	monthly	9,7	-0,6	10,5	0,2	9,3	-1,0	10,3
VI	1	10,9		18,6		14,3		
	2	12,2		14,8		15,1		
	3	14,9		17,2		16,0		
	monthly	12,7	-0,7	16,9	3,5	15,1	1,7	13,4
VII	1	16,3		14,8		17,1		
	2	15,5		17,6		16,8		
	3	18,7		20,1		17,7		
	monthly	16,8	2,5	17,6	3,3	17,2	2,9	14,3
VIII	1	14,3		20,5		15,6		
	2	13,0		16,8		14,6		
	3	12,5		12,3		14,2		
	monthly	13,3	-0,1	16,4	3,0	14,8	1,4	13,4

*R - registrated

**A – anomaly

*** Mma - multi-annual average

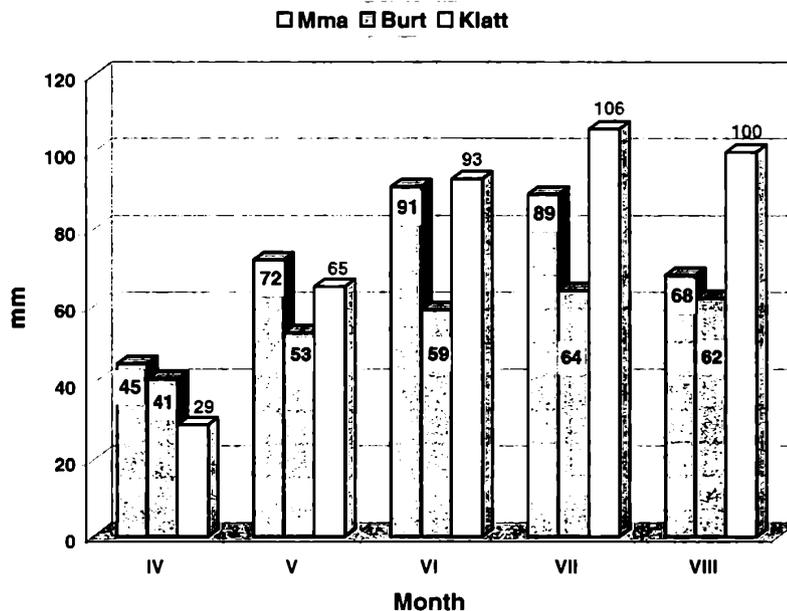


Mma - multi-annual average

Figure 1. Comparisons between the multi –annual average and the necessary of precipitations (mm) evaluated by Burt and Klatt at Lucina

The data from the figure 1 and 2 prove that the differences between the two estimators are obvious in the months when the medium temperatures are higher than 10 °C.

Because of the conditions specific in which have been elaborated the above mentioned relations, the optimal quantity of precipitations for Lucina is approximated better using the relation elaborated by Klatt (figure 1), and for Suceava the same desiderate is realized using the Burt estimator (fig.2). The use of Klatt estimator for Suceava is more suited to the approximation of precipitations quantities that can determine a temporarily excessive humidity.



Mma - multi-annual average

Figure 2. Comparisons between the multi –annual average and the necessary of precipitations (mm) evaluated by Burt and Klatt at Suceava

In what concerns the regime of precipitations registered in the two localities, the data written in Table 4 and 5 allow outlining more reasons.

Even if the volume of precipitations form April – August (462 – 678 mm/m²) from Lucina is bigger in comparison with that from Suceava (312-448 mm/m²), even though the frequency of the months that divert significantly from the multi –annual average a fort of 33 %. This thing suggests that the lack of uniformity of the precipitations’ repartition can’t be encountered in the areas with humid climate.

If the two localities don’t differ too much from the point of view of the irregularity of monthly values (33% at Lucina and 40 % at Suceava). This way if at Lucina the irregularity of these values repartition (in April –August from 1997-1999) has been of 53%, at Suceava the frequency of the irregularity has raised at 70%.

Because the rhythm of plants’ growth isn’t correlated with the level of insuring the quantities of precipitations equivalent with the multi –annual averages (monthly ore decade), but also with the degree of insuring the water necessary determined by the total of meteorological conditions, during time numerous modalities of expressing the necessary of precipitations have been elaborated for compensating the potential or real evapor- transpiration. Among these have been selected the relationships elaborated by Burt (1968) and by Klatt (1969).

Table 4: Pluviometrical regime at Lucina

Month	Decade	1997				1998				1999				Mma
		mm/m ²		np – mm/m ² *		mm/m ²		np – mm/m ² *		mm/m ²		np – mm/m ² *		
		R*	A**	calc.	Diff.	R*	A**	calc.	Diff.	R*	A**	Calc.	Diff.	
IV	1	9		2	7	147		3	144	12		3	9	
	2	38		2	36	37		6	31	21		4	17	
	3	29		6	23	7		8	-1	25		8	17	
	monthly	76	24	10	66	191	139	17	174	58	6	15	43	52
V	1	6		10	-4	25		15	10	9		9	0	
	2	9		23	-14	80		12	68	29		11	18	
	3	20		8	12	19		18	1	27		17	10	
	monthly	35	-6,5	41	-6	124	24	45	79	65	-35	37	28	100
VI	1	16		15	1	5		35	-30	18		26	-8	
	2	54		18	36	79		25	54	16		25	-9	
	3	27		25	2	33		31	2	83		28	55	
	monthly	97	-17	58	39	117	3	91	26	117	3	79	38	114
VII	1	36		29	7	44		25	19	39		31	8	
	2	47		26	21	54		32	22	46		30	16	
	3	23		38	-15	14		43	-29	48		35	13	
	monthly	106	-16	93	13	112	-10	100	12	133	11	96	37	122
VIII	1	25		23	2	17		42	-25	17		27	-10	
	2	2		20	-18	104		30	74	22		24	-2	
	3	145		20	125	13		20	-7	50		24	26	
	monthly	172	79	63	109	134	41	92	42	89	-4	75	14	93

Table 5: Pluviometrical regime at Suceava

Month	Decade	1997				1998				1999				M ma
		mm/m ²		np – mm/m ² *		mm/m ²		np – mm/m ² *		mm/m ²		np – mm/m ² *		
		R*	A**	calc.	Diff.	R*	A**	calc.	Diff.	R*	A**	calc.	Diff.	
I	2	3	4	5	6	7	8	9	10	11	12	13	14	15
IV	1	6		11	-	4		16	-12	20		14	6	
	2	27		11	16	49		15	34	51		14	37	
	3	19		13	6	11		15	-4	16		15	-1	
	Monthly	52	7	35	17	64	19	46	18	87	42	43	44	45
V	1	1		19	-18	13		17	-4	2		15	-13	
	2	2		20	-18	92		16	76	25		16	9	
	3	59		18	41	22		19	3	3		20	-17	
	Monthly	62	-10	57	5	127	55	52	75	30	-42	51	-21	72
VI	1	15		19	-4	4		22	-18	19		22	-3	
	2	51		20	31	126		19	107	5		23	-18	
	3	25		21	4	5		21	-16	36		20	16	
	Monthly	91	0	60	31	105	44	62	73	60	-31	65	-5	91
VII	1	38		22	16	32		19	13	9		25	-16	
	2	44		19	25	59		21	38	29		22	7	
	3	30		23	7	10		27	-17	28		24	4	
	Monthly	112	23	64	48	101	12	67	34	66	-23	71	-5	89

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
VIII	1	13		21	-8	4		23	-19	12		22	-10	
	2	1		20	-19	7		21	-14	14		22	-8	
	3	74		21	53	10		19	-9	43		21	22	
	Monthly	88	20	62	26	21	-47	63	-42	69	1	65	4	68

*R – registrated;

**A – anomaly;

Mma - multi-annual average;

Calc. – Calculate;

Diff. - Difference

Comparatively with the necessary of precipitations estimated with the help of specified relations, data written in tables 4 and 5, point out that the frequency of months (from the 3 years) with abundant and excessive humidity has been of 73% at Lucina and of 53 % at Suceava. But taking into consideration the values of decades, the differences between the two localities become more and more obvious and if at Lucina the frequency of drought decades has been of 18%, at Suceava this one has been of 40 %.

Conclusions

- The meteorological characterization of some shorter stages (decades or even pentades), is more useful for a successful ecological evaluation of an area;
- The impact of some meteorological conditions over the vegetation can be best illustrated by the frequency and the size of the deviations of some characteristics of the weather towards the “estimated necessary” and not towards the multi – annual average.
- Sometimes for appreciating the advantage of the same meteorological factor could be used more estimators, taking into account also other particularities (edaphic, etc).

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