CLIMATIC WATER BALANCE OF EXPERIMENTAL DRAINAGE FIELD VARNA NEAR SABAC

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In the area of experimental drainage field Varna near Šabac, owned by Institute of soil science, was defined climatic water regime using 40 years of observations of climatic parameters.

It was defined the monthly appearance of surplus and deficit of water.

Key words:: Climatic water regime, surplus, deficit

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INTRODUCTION

The study locality Varna, belongs to the region of Mačva.

This region has notable processes of seasonal water logging which have a negative effect on agricultural crops.

The sample plot of the Institut of Soil Science was established at the village Varna, to monitor the effect of fertilization on pseudogley soils. In 1978 the main project of the drainage of a part of simple plot, was construed.

Drainage sample plot consists of two separate parts of rectangular form, separated by a road for mechanization. One part consists of three plots A,B,C, and the other part consist of six plots as I to VI. All plots are of the same size 75,0 x 52,0 m, individual area 0,39 ha. The basis for dewatering of the sample plots is flexible perforates PVC drainage pipes, spacing 25 m. Within the plots there are two drains ⌀80 mm, at the depth of 0,95 m. Drain leght is equal to plot lenght and amounts to 52 m, minimal desing slope is 0,25%.

During June 2002, the existing drainage sample plot was reconstructed. Drainage was introduced in the part of the sample plot where it did not exist. A part of the sample plot was treated with saturation silt in the aim of improving the unfavorable chemical properties of the soils. Tile drains were laid in two variants, with drain spacing of 20 and 30 meters, laid in gravel filter at the depth of 0.9m with slotted pipes, ⌀ 80m.

MATERIL AND METHODS

The preliminary research of water characteristics of the soil is based on the so-called climatic water balance, which involves only the precipitation and the evapotranspiration as input and output parameters in the balance equation. Potential evapotranspiration in the study period is calculated by H.F.Blaney and W.D.Criddle method. This method uses very few input data, but it can lead to a satisfactorily precise volume of potential evapotranspiration. The final corrected formula is as follows:

$$ETo = \left[p \cdot (0,47T + 8,13) \right] \cdot c \quad , \text{ where:}$$

ETo - potential evapotranspiration, in mm/day;

p - average duration of daylight in relation to annual sum, in %;

T - mean monthly air temperature in °C.

c – correction factor, which includes the global effect of relative air humidity, duration of daily insolation and wind velocity on ETo.

The climate water balance for individual months is calculated based on the following formula:

$$P = ETo \pm \Delta W, \text{ where:}$$

P - mean monthly rainfall, in mm;

ETo - mean monthly potential evapotranspiration, in mm;

ΔW - water surplus, water deficit per month, in mm.

OBSERVATION RESULTS

Figure1. presents the comparative survey of monthly precipitation and evapotranspiration over the study period (1964-2002).
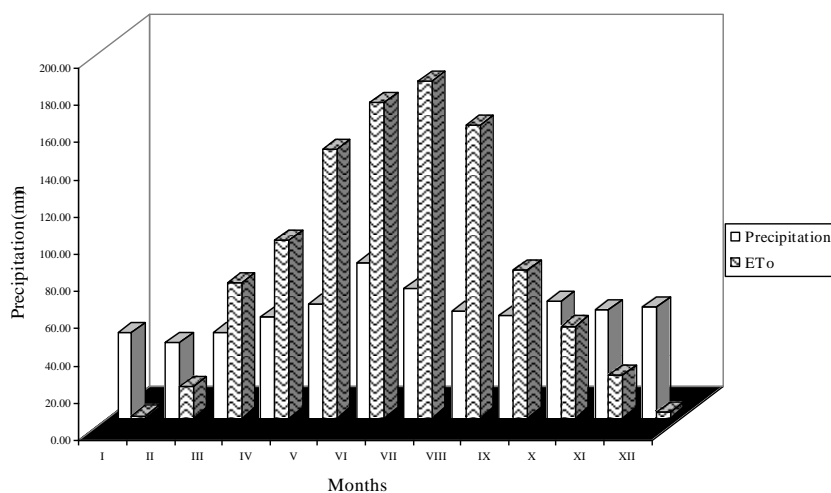

Figure 1.Comparative review of rainfall and ETo in the area of experimental field Varna

Excess water in the form of precipitation at the study locality occurs during January, February, October, November and December. During other months, evapotranspiration is higher than precipitation.

Climate water balance is calculated based on the precipitation and evapotranspiration data. The obtained values of moisture excess and deficit in the study region are presented in Table 1 and in Figures 2 and 3.

Table 1.Annualy flow of summarized yearly advances of climatic water balance (1964-2002)

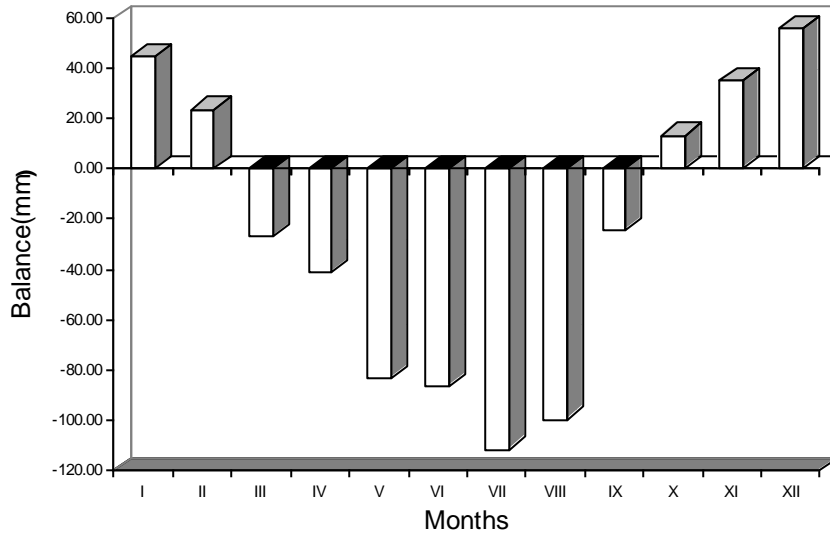| Months	Precipitation (mm/month)	ET0 (mm/month)	±ΔW (mm/month)	K.V.B. (mm/month)
I	46.30	1.60	44.70	44.70
II	40.70	16.90	23.80	68.50
III	45.90	72.90	-27.00	41.50
IV	54.40	95.80	-41.40	0.10
V	61.40	144.50	-83.10	-83.00
VI	83.60	170.00	-86.40	-169.40
VII	69.90	181.60	-111.70	-281.10
VIII	57.70	157.40	-99.70	-380.80
IX	55.30	79.80	-24.50	-405.30
X	53.00	49.60	3.40	-401.90
XI	58.70	23.50	35.20	-366.70
XII	60.00	3.60	56.40	-310.30

Figure 2. Histogram monthly values of climatic water balance

Figure 2 gives the idea of monthly values of climate water balance based on which we can calculate the monthly surplus and deficit values of climate water balance.
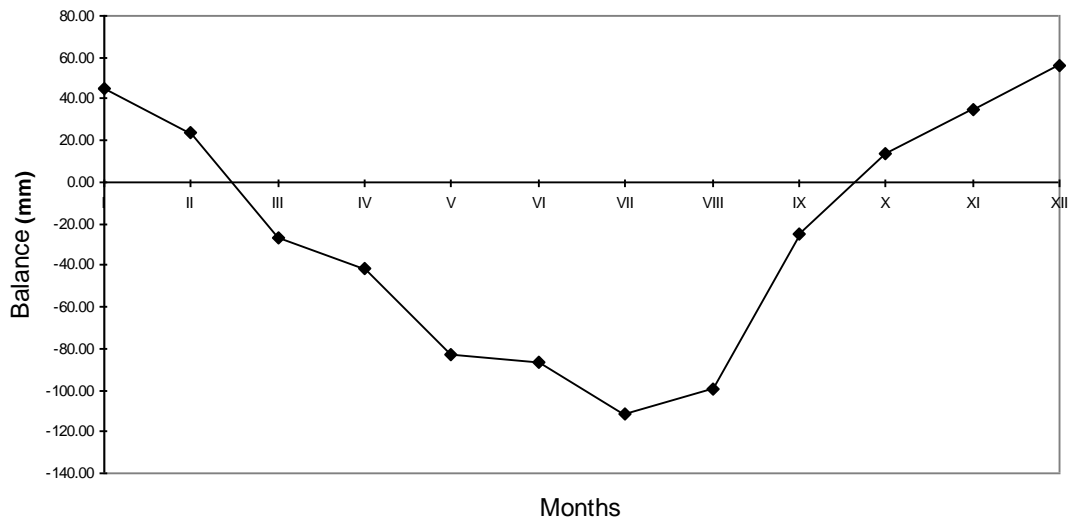

Figure 3.Montly values of climatic water balance

Figure 3 show that excess water occurs till the middle of the first decade of March, when the balance equals zero. A strong water deficit lasts till the end of the year.

CONCLUSION

The data in this paper result from the processing of the meteorological data from the sample plot Varna, during the period 1964-2002. The main parameters of climate water balance are determined based on rainfall and evapotranspiration as the input and output parameters. The paper can be applied in the preliminary investigations of soil moisture characteristics. The data show that excess water is present from October to the first decade of March, while in the remaining part of the year there is a notable water deficit.

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KLIMATSKI VODNI BILANS OGLEDNOG
DRENAŽNOG POLJA VARNA KOD ŠAPCA

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Na području oglednog drenažnog polja Varna kod Šapca, Instituta za zemljište, određen je klimatski vodni bilans, za četrdesetogodišnji period osmatranja klimatskih parametara. Definisane su mesečne vrednosti suficita i deficita vode. Analiza osnovnih klimatskih elemenata: temperature vazduha, padavina, relativne vlažnosti vazduha, osunčavanja i brzine vetra izvršena je na osnovu raspoloživih podataka sa meteoroloških stanica Šabac, Loznica i Valjevo, za period osmatranja 1964-2002 godina. Potencijalna evapotranspiracija odredjena je metodom H.F.Blaney i W.D.Criddle.

Proračun klimatskog vodnog bilansa za pojedine mesece izvršen je na osnovu razlike vrednosti srednjih mesečnih padavina i srednje mesečne vrednosti potencijalne evapotranspiracije.

Obradjeni podaci pokazuju da je suficit vode prisutan od oktobra do prve dekade marta dok je u ostalom delu godine primetan klimatski deficit vode.